

Project Manual and Specifications

**Southbridge Senior Center
Kitchen Hood Renovations**

Southbridge, MA



**Issued for Bid & Construction
November 12, 2024**

**Volume I of I
Divisions 00 – 26**



16 Chestnut Street, Suite 301
Foxborough, MA 02035
www.kba-architects.com

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

PROJECT MANUAL AND SPECIFICATIONS

TABLE OF CONTENTS

LIST OF DRAWINGS

BIDDING AND CONTRACTING REQUIREMENTS

INVITATION TO BID

INSTRUCTIONS TO BIDDERS

EXISTING HAZARDOUS MATERIALS INFORMATION

BID BOND AIA A310

FORM FOR GENERAL BID

STATEMENT OF NON-COLLUSION – GENERAL BIDDER

FOREIGN CORPORATION CERTIFICATION

TAX COMPLIANCE CERTIFICATION

CONTRACT FOR COMPLETION OF CERTAIN PUBLIC WORKS OR BUILDING

IMPROVEMENTS/MAINTENANCE/REPAIRS IN THE TOWN OF SOUTHBRIDGE

REFERENCE FORM

PERFORMANCE BOND

FORM OF SUBCONTRACT

CERTIFICATE OF CORPORATION TO SIGN CONTRACT

PREVAILING WAGE NOTIFICATION FORM

PREVAILING WAGE RATES

WEEKLY PAYROLL REPORT FORM

WEEKLY PAYROLL STATEMENT OF COMPLIANCE FORM

EXCERPTS FROM APPLICABLE STATE LAW

DIVISION 01 – GENERAL REQUIREMENTS

01 10 00 SUMMARY

01 26 00 CONTRACT MODIFICATION PROCEDURES

ASI BLANK

PR BLANK

RRFI RESPONSE BLANK

RCOP BLANK

01 29 00 PAYMENT PROCEDURES

01 31 00 PROJECT MANAGEMENT AND COORDINATION

ELECTRONIC FILES USE AND LIABILITY WAIVER

01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

01 33 00 SUBMITTAL PROCEDURES

SHOP DRAWING REVIEW STAMP

01 40 00 QUALITY REQUIREMENTS

01 42 00 REFERENCES

01 50 00 TEMPORARY FACILITIES AND CONTROLS

01 60 00 PRODUCT REQUIREMENTS

SUBSTITUTION REQUEST FORM

01 73 00 EXECUTION

01 73 29 CUTTING AND PATCHING

DIVISION 04 – MASONRY

04 20 00 UNIT MASONRY

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

DIVISION 05 – METALS

05 12 00 STRUCTURAL STEEL

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

06 10 53 MISCELLANEOUS ROUGH CARPENTRY

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 54 00 THERMOPLASTIC MEMBRANE ROOFING

07 84 13 PENETRATION FIRESTOPPING

07 92 00 JOINT SEALANTS

DIVISION 09 – FINISHES

09 91 00 PAINTING

DIVISION 22 – PLUMBING

22 00 00 PLUMBING

DIVISION 23 – HEATING, VENTILATION AND AIR CONDITIONING

23 00 00 HVAC

23 05 48 VIBRATION CONTROL

23 38 13 COMMERCIAL-KITCHEN HOODS

DIVISION 26 – ELECTRICAL

26 00 00 ELECTRICAL

END OF SECTION TOC

LIST OF DRAWINGS

REFERENCE & CODE

R0.01 GENERAL INFORMATION AND CODE

STRUCTURAL

S1.01 PART ROOF FRAMING PLAN

DEMOLITION

A1.00 DEMOLITION PLAN

ARCHITECTURAL

A1.01 NEW CONSTRUCTION PLAN

PLUMBING

P1.00 GAS PIPING PLAN – PLUMBING

MECHANICAL

M0.01 HVAC LEGEND, SCHEDULES, CONTROLS

M1.01 HVAC FLOOR PLAN

M1.02 HVAC ROOF PLAN

M2.01 HVAC DETAILS

VC-1 HVAC VIBRATION CONTROLS I

VC-2 HVAC VIBRATION CONTROLS II

ELECTRICAL

E1.01 ELECTRICAL SYMBOL LIST AND DETAILS

E1.02 FIRST FLOOR PLANS

E1.03 ROOF PLAN

ED1.01 MAIN LEVEL DEMOLITION PLAN

END OF LOD

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

INVITATION TO BID

The Town of Southbridge, Massachusetts, hereinafter referred to as the “Awarding Authority”, acting by and through its Town Manager invites **sealed bids** for **Southbridge Sr. Center Kitchen Exhaust at 153 Chestnut St, Southbridge, MA 01550** in accordance with the Bidding and Contract Documents prepared by KAESTLE BOOS ASSOCIATES INC., 16 Chestnut Street, Suite 301, Foxborough, MA 02035 (Telephone: 508-549-9906; Fax: 508-549-9907), hereinafter referred to as the Architect, will be received by the Southbridge, **41 Elm Street, Southbridge MA 01550**, at the dates and times specified below at which time the proposals will be publicly opened and read:

General Contractor Bids: **Thursday, December 5, 2024 at 1:00pm.**

Address Bids to:

**Town of Southbridge, Town Manager’s Office
ATTN: John D. Jovan Jr., Town Manager
41 Elm Street,
Southbridge MA 01550**

Bid Security: Each Bid must be accompanied by a bid security consisting of a BID BOND, CASH, CERTIFIED CHECK, TREASURER'S or CASHIER'S CHECK issued by a responsible bank or trust company, payable to the Southbridge in the amount of **(5%)** of the bid price.

Pre-Bid Conference: A pre-bid conference will be held on Tuesday, November 21, 2024, at the Southbridge Sr. Center
All attending will assemble in the Main Entrance Lobby.

Each Bidder may obtain complete sets of the Electronic Bidding Documents, including Bid Forms, - **1:00PM, local time, on Wednesday, November 13, 2024**, from The Southbridge Town Managers Office, 41 Elm Street Southbridge MA AND , 508-764-5405 OR at the towns website **www.ci.southbridge.ma.us** Addenda will be issued to all Bidders **registered with The Town Managers Office**. Addenda will be emailed.

Documents may be examined at each of the following locations:

Office of the Architect KAESTLE BOOS ASSOCIATES INC.
16 Chestnut Street, Suite 301, Foxborough, MA 02035

A performance bond in an amount equal to 50 percent of the total amount of the bid with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract as well as a labor and materials payment bond in an amount equal to 100 percent of the total bid amount.

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

Attention is directed to the minimum wage rates to be paid as determined by the Commissioner of Labor and Workforce Development, Division of Occupational Safety, under the provisions of Commonwealth of Massachusetts General Laws, Chapter 149, Section 26 and 27D inclusive.

The estimated cost of this Project is **\$50,000**.

Selection of the contractor will be based upon bidder qualifications, including evidence of past performance in similar projects, and bid price. The contract will be awarded to the bidder deemed by the Awarding Authority to be the lowest responsible and eligible bidder. **Each bid shall include a complete list of projects completed over the past 5 years with a brief description, contract value and project reference contact information.**

Southbridge is an affirmative action/equal opportunity owner.

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

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

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS

RECEIPT AND OPENING OF BIDS

The **Town of Southbridge** hereinafter called the Owner or Awarding Authority will receive sealed Bids in accordance with the requirements of the INVITATION TO BID.

LOCATION AND WORK TO BE DONE

The work under this Contract is identified as **Southbridge Sr. Center Hood Renovations**. The Work is generally described in Division 01 Section entitled "SUMMARY". The Contractor shall furnish all labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies, and all other things necessary to do all work required for the completion of each item of the Work and as herein specified. The Work to be done shall not be limited to the exact extent mentioned or described but shall include all incidental work necessary or customarily done for the completion of that item.

PREPARATION OF BID

- Each bid must be submitted on the prescribed form. All blank spaces for bid prices must filled in, in ink or typewritten, in both words and figures.
- Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his address, and endorsed with the name of the project as specified in the INVITATION TO BID.
- If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the INVITATION TO BID.
- Each bid shall include a complete list of projects completed over the past 5 years with a brief descriptions, contract value and project reference contact information.
-

BID OPENING PROCEDURE

The following list of requirements shall apply to each filed bid. Bids not meeting all the requirements for timeliness and security will be rejected without opening; bids not meeting signature and addenda requirements will be rejected prior to checking of bid amounts.

- Bids shall be filed at the place and before the time specified in the INVITATION TO BID.
- Properly executed bid security shall accompany the bid within its sealed envelope.
- Bid signatures will be checked.
- All addenda will be sent via mail, fax or email to all prospective bidders and the last of which will be faxed or emailed. All bidders shall include with their bids the written acknowledgment in FORM FOR GENERAL BID

TELEGRAPHIC MODIFICATION

- N/A

ABILITY AND EXPERIENCE OF BIDDER

- No award will be made to any bidder who cannot satisfy the Owner that s/he has sufficient ability and experience in this class of work and sufficient capital and plant to enable her/him to prosecute and complete the work successfully within the time named. The Owner's decision or judgment on these matters will be final, conclusive, and binding.
- The Owner may make such investigations as s/he deems necessary, and the bidder shall furnish to the Owner, under oath if so required, all such information and data for this purpose as the Owner may request.

CONDITIONS OF WORK

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

ADDENDA AND INTERPRETATIONS

- No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. All information given to bidders other than by means of the plans, specifications, or by addenda, as described below, is given informally and shall not be used as the basis of a claim against the Owner.
- Requests for interpretation may be submitted via email. Every request for such interpretation should be in writing addressed the attention of **Matthew Kozikowski** at Kaestle Boos Associates, Inc. Email requests shall be sent to **mkozikowski@kba-architects.com**. Email requests shall include a subject heading that clearly identifies “**Southbridge Sr. Center Hood**” and includes the phrase “**Request for Clarification**” or “**Request for Interpretation**.” Requests for interpretation prior to the submission of bids must be received no later than **Thursday, November 21, 2024**. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, when issued, will be sent via either mail, email, or fax to all prospective bidders (at the respective address, email address, or fax number furnished by them for such purposes), not later than two days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

SECURITY FOR FAITHFUL PERFORMANCE

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

POWER OF ATTORNEY

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

LAWS AND REGULATIONS

- The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full. Attention is directed to “EXCERPTS FROM APPLICABLE STATE LAW” and to other applicable sections of this specification.

LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

- The successful bidder, upon her/his failure or refusal to execute and deliver the Contract and bonds required within five (5) days after s/he has received notice of the acceptance of his/her bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, a portion of security deposited with his/her bid, but the amount forfeited shall not exceed the difference between his/her bid price and the bid price of the next lowest responsible and eligible bidder. In case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the bidder, his/her bid deposit will be returned.

OBLIGATION OF BIDDER

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

INFORMATION NOT GUARANTEED

- All information given in the Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.
- It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures encountered during construction will be the same as those indicated in the Contract Documents.
- It is further agreed and understood that no bidder or Contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner or the Architect, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

BID SECURITY

- Each bid must be accompanied by a certified check, a bid bond, cash, a treasurer's or cashier's check, payable to the **Town of Southbridge**, in the amount stated in the INVITATION TO BID. Such checks will be returned to all except the three (3) lowest responsible and eligible bidders within five days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids, and the remaining checks will be returned promptly after the Owner and the accepted bidder have executed the Contract, or if no notice of intent to award has been presented to the selected contractor within thirty (30) days, Saturdays, Sundays and holidays excluded, after the date of the opening of bids, upon demand of the bidder at any time thereafter.

RIGHT TO REJECT BID

- The Owner reserves the right to waive any informalities or reject any and all bids, should the Owner deem it to be in the public interest to do so.
- The Owner may also reject bids which in its sole judgment are incomplete, conditional, obscure or not responsive or which contain additions not called for, erasures not properly initialed, alterations, or similar irregularities, or the Owner may waive such omissions, conditions or irregularities.

TIME FOR COMPLETION

- The bidder must agree to commence work within ten (10) days of the date of the Notice to Proceed and to fully complete the project within the time limit stated in the FORM FOR GENERAL BID.

COMPARISON OF BIDS

- Bids will be compared on the basis of the quantities and unit and lump sum prices set forth in the bid forms.
- In the event that there is a discrepancy in the FORM FOR GENERAL BID between the lump sum or unit prices written in words and figures, the prices written in words will govern.

AWARD OF CONTRACT

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

STATUTES REGULATING COMPETITIVE BIDDING

- Any bid which does not comply with the provisions of Commonwealth of Massachusetts General Laws Chapter 30, Sections 39M, as amended, need not be accepted and the Owner may reject every such bid.

CERTIFICATE OF ELIGIBILITY AND UPDATE STATEMENT

- In accordance with Commonwealth of Massachusetts G.L. c.30, §39M, every bid must be accompanied by a comprehensive list of all ongoing projects, Projects completed within the past (3) three years.

WAGE RATES

- Prevailing Wage Rates as determined by the Commissioner of the Department of Labor and Workforce Development, Division of Occupational Safety (DOS) under the provision of the Commonwealth of Massachusetts General Laws, Chapter 149, Section 26 to 27G, as amended, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if necessary, any additional information on Prevailing Wage Rates for those trades people who may be employed for the proposed work under this contract.
- Schedules of Prevailing Wage Rates as provided by the Commonwealth of Massachusetts is included in the Project Manual.

CONTRACTOR RECORDS

- The Contractor shall comply with the provisions of Commonwealth of Massachusetts General Laws, Chapter 149, Section 39R, concerning Contractor records.

INSURANCE

- The Contractor shall carry and continuously maintain until completion of the Contract, insurance as specified in the GENERAL CONDITIONS and in such form as shall protect her/him performing work covered by this Contract, or the **Town of Southbridge** and its employees, agents and officials, from all claims and liability for damages for bodily injury, including accidental death, and for property damage, which may arise from operations under this Contract. The Contractor covenants and agrees to hold the **Town of Southbridge** and its employees, agents and officials harmless from

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

loss or damage due to claims for personal injury and/or property damage arising from, or in connection with operations under this Contract.

AFFIRMATIVE ACTION / EQUAL OPPORTUNITY

- The **Town of Southbridge** is an affirmative action/equal opportunity owner.

END OF DOCUMENT

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

EXISTING HAZARDOUS MATERIALS INFORMATION

PART 1 - GENERAL

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for the Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. The following report for Project is appended to this Document.
 - 1. Pre-Renovation Asbestos Survey Report; prepared by Atlas Technical Consultant, LLC, dated June 24, 2024

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK



PRE-RENOVATION ASBESTOS SURVEY REPORT

Southbridge Community Center
Southbridge, Massachusetts

PREPARED FOR:

Town of Southbridge
153 Chestnut Street, Southbridge, MA 01550

Attention: Katie Alicea-Tilton, Director
Phone: 508-764-1469
Email: john.lafleche@gmail.com
Phone: 774-230-6472 (Mr. John Lafleche, Site Contact)

PREPARED BY:

Atlas Technical Consultants LLC
73 Williams Franks Drive
West Springfield, MA 01089

June 24, 2024



June 24, 2024

Town of Southbridge
153 Chestnut Street, Southbridge, MA 01550

Attention: Katie Alicea-Tilton, Director
Phone: 508-764-1469
Email: john.lafleche@gmail.com
Phone: 774-230-6472 (Mr. John Lafleche, Site Contact)

**Subject: Pre-Renovation Asbestos Survey Report
Southbridge Community Center- Select Kitchen and Roof Areas
Southbridge, MA
Atlas Project # 183CG24032**

Dear Ms. Alicea-Tilton and Mr. Lafleche:

Atlas is pleased to present this report describing non-destructive surveys performed to identify regulated materials that may be disturbed during the proposed kitchen and roof renovation activities. Atlas's Massachusetts licensed asbestos site inspector completed a survey for asbestos containing materials. The executive summary and report below outline the surveys and results.

If you have any questions, please call us at (413) 781-0070.

Respectfully submitted,

A handwritten signature in black ink, appearing to be "JC" or similar initials.

Craig Connett
Massachusetts Asbestos Inspector AI900707

A handwritten signature in black ink, reading "Christopher L. Godfrey".

Christopher Godfrey
Senior Project Manager

CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION.....	1
1.1 LIMITATIONS.....	2
2. METHODS AND MATERIALS.....	2
2.1 ASBESTOS.....	2
3. RESULTS AND FINDINGS.....	4
4. DISCUSSION AND INTERPRETATION	4
4.1 ASBESTOS.....	4
5. CONCLUSION.....	4

TABLES

Table 1	All Materials Suspected of Containing Asbestos

APPENDICES

Appendix I	Laboratory Data



EXECUTIVE SUMMARY

Atlas completed a survey on June 12, 2024 for asbestos containing materials (ACM) in the kitchen area, and of the roof directly above the kitchen at the Southbridge Community Center in Southbridge, Massachusetts. Samples were only collected from the kitchen and roof.

The non-destructive surveys were performed in order to identify regulated materials that may be disturbed during the proposed kitchen renovation project. Survey findings for the subject Site are presented in the body of this report. The results of this survey **DO NOT** meet the requirements of the National Emissions Standard for Hazardous Air Pollutants (NESHAPs) for building demolition due to the limitations listed in the limitations section of this report.

ATLAS collected a total of **12** bulk samples of suspect ACM from these areas listed above. Asbestos was detected or presumed in various building materials sampled (Pipe fittings and Pipe Insulation).

Analytical data sheets for all samples collected are provided as Appendix I.

The following report summarizes the independent conclusions representing Atlas's best professional judgment based on information and data available to us during the course of this investigation. Factual information regarding operations, conditions, and test data provided by the Client, owner, or their representative has been assumed to be correct and complete. Additionally, the conclusions presented are based on the conditions that existed at the time of the assessment.

1. INTRODUCTION

These surveys were performed at the request of Mr. John Lafleche, Town of Southbridge representative for the purpose of identifying hazardous building materials that may be impacted during the proposed kitchen renovation project.

Regulatory requirements and survey practices applicable to renovation and demolition projects in Massachusetts are as follows, but not limited to the following:

Asbestos

- The United States Environmental Protection Agency (USEPA) NESHAPs (40 CFR 61, Subpart M) requires facilities be inspected by competent persons for the presence of ACM which could or will be disturbed during renovation, construction and demolition activities. Where quantities of ACM exceed 160 square feet or 260 linear feet, asbestos abatement (removal) is required.
- The Massachusetts Department of Environmental Protection (MassDEP) additionally regulates ACM under 310 CMR 7.15 & 310 CMR 19.061.

- The Massachusetts Executive Office of Labor and Workforce Development, Department of Labor Standards (MA DLWD-DLS) regulates asbestos worker protection and work practices under 453 CMR 28.00.
- The Occupational Safety and Health Administration (OSHA) regulates asbestos worker protection under 29 CFR 1926.1101.

1.1 LIMITATIONS

The term “non-destructive sampling method” refers to a method of collecting samples that does not significantly impact interior or exterior finishes of the building. Surveys for the presence of ACM are therefore limited to those materials accessible by non-destructive sampling methods. ACM may be present in materials not accessible by this sampling methodology, and may be encountered during renovation or demolition of the structure. The term “destructive sampling method” refers to the method of collecting samples that would require destruction of various building systems (i.e. wall cavities, ceilings, flooring materials, roofing) for the purpose of locating hidden heating, plumbing, or other building components that may contain ACM. Destructive methods are recommended for properties slated for demolition. Additional limitations may exist for both destructive and non-destructive sampling methods. Certain locations of the building may be physically inaccessible, or inaccessible due to electrical, mechanical, structural, or other hazards which might exist in the structure at the time of the survey.

ATLAS evaluated materials throughout the electrical rooms that may be impacted as part of the upgrade. Areas that were accessible only through structurally damaging methods or were part of or within energized equipment were not evaluated.

Suspect ACM subsequently identified or encountered in physically inaccessible areas during demolition and/or renovation activities and not listed in this report should be assumed to contain asbestos unless testing confirms otherwise.

The following areas were not included in the scope of work at the time of this evaluation.

- Materials only accessible through structural demolition (including within CMU systems);
- Any material and location outside of the ones tested within this report;
- Materials associated with functional equipment, machinery, and building systems including mechanical, plumbing, electrical and HVAC; and
- Counter, sinks, cove base, or floor tile per the request of David Langedin (onsite contact).

2. METHODS AND MATERIALS

2.1 ASBESTOS

Samples were collected per regulations governing asbestos surveys. Samples were placed into plastic bags with an air tight seal. Labels were affixed to the sample bags with specific nomenclature.



Bulk samples were analyzed by Polarized Light Microscopy (PLM) using the USEPA/600/R-93/116 method. Sample analysis was conducted by EMSL Analytical of Long Island City, NY (NVLAP Accreditation 101048-9).

There are six minerals grouped into the term “asbestos”. Chrysotile, amosite, and crocidolite are the asbestos minerals most commonly found in building materials. ACM is defined as a material containing more than one percent (1%) asbestos by weight. Asbestos Containing Building Materials (ACBM) is a subset of materials in the group ACM and are considered to be ACM that is found in or on interior structural members of a building. Materials found to be asbestos containing are listed in Section 3.0. Exact sample compositions are included in the laboratory reports or chains of custody found in Appendix I.

PLM is the root method used for the identification of ACM. The USEPA Office of Research and Development (USEPA/ORD) has reviewed data from performance audits of various laboratories performing PLM. The results of that review indicated an unacceptable number of false negatives and positives for visual estimation of materials containing less than 10% asbestos. On the basis of those findings the NESHAP regulations were amended on November 20, 1990 (Federal Register, V.55, and N.224). The revisions state that if the analyst detects asbestos in the sample and estimates the amount to be less than 10% by visual estimation, the parties legally responsible (owner or operator) for the building may (1) elect to assume the amount to be greater than 1% and treat the material as ACM or (2) require verification of the amount by point counting. Point counting is a technique used to quantify the amount of asbestos present in a sample on which PLM has already been performed. ATLAS recommends point counting re-analysis for asbestos values less than 10%, and where applicable, those results are reflected in this report. In instances where client authorization is not received for this re-analysis, PLM visual results indicating a trace or 1% value will be reported as assumed ACM as required by item (1) above.

A similar situation exists for matrix bound fibers such as those found in floor tiles, mastics, and asphalt based materials. The organic matrix of these bulk samples may interfere with the identification and quantification of asbestos mineral content. These types of samples are generally referred to as Non-friable organically bound (NOB) materials. Transmission Electron Microscopy (TEM-NOB) is a method that utilizes a combination of special sample preparation techniques and high magnification to quantify asbestos content with greater accuracy than PLM. Currently only the State of New York has regulations requiring TEM-NOB re-analysis of suspect ACM for which negative or trace determination resulted from PLM analysis. Although additional cost is involved, ATLAS recommends TEM-NOB analysis under certain circumstances, as a state of the art means of survey. ATLAS did not submit any samples for TEM-NOB analysis from this property.



3. RESULTS AND FINDINGS

The results of this survey are presented in tabular form (attached). The tables summarize the nature, distribution and estimated quantity of ACM found during this survey.

- Summary of all Materials Suspected of Containing Asbestos is found in Table 1.

4. DISCUSSION AND INTERPRETATION

4.1 ASBESTOS

Response actions are based in part upon our current understanding of area usage or future usage at the time of the survey. Removal is always required where pending renovation or demolition activity will disturb ACM. Any material discovered during the course of renovation or demolition activities which is not identified in this report should be presumed to contain asbestos until analysis proves otherwise. Section 1.1 Limitations details areas that were deemed inaccessible or were not included in the scope of work.

5. CONCLUSION

The results of this survey **DO NOT** meet the requirements of the National Emissions Standard for Hazardous Air Pollutants (NESHAPs) for building demolition.

Various materials sampled contain asbestos. Any material discovered during renovation activities that has not been sampled must be considered an ACM or sampled accordingly by a Massachusetts licensed asbestos inspector.

TABLES

Table 1- All Materials Suspected of Containg Asbestos, Southbridge Community Center (Kitchen and Roof Inspection)

LabSample ID	Client Sample	Sample Location	Sample Description	Collected Date	Test	Classification	Total Asbestos %	Approximate Quantity
242402954-0001	01A	Kitchen	Wall block grout	06/12/2024	PLM	Non-ACM	ND	
242402954-0002	01B	Kitchen	Wall block grout	06/12/2024	PLM	Non-ACM	ND	
242402954-0003	02A	Kitchen	Pipe Insulation	06/12/2024	PLM	ACM	27.0	50 Linear Feet
242402954-0004	02B	Kitchen	Pipe Insulation	06/12/2024	PLM		Pos Stop	
242402954-0005	02C	Kitchen	Pipe Insulation	06/12/2024	PLM		Pos Stop	
242402954-0006	03A	Kitchen	Pipe Fittings	06/12/2024	PLM	ACM	28.0	12 Fittings
242402954-0007	03B	Kitchen	Pipe Fittings	06/12/2024	PLM		Pos Stop	
242402954-0008	03C	Kitchen	Pipe Fittings	06/12/2024	PLM		Pos Stop	
242402954-0009	04A	Kitchen	White Backsplash Adhesive	06/12/2024	PLM	Non-ACM	ND	
242402954-0010	04B	Kitchen	White Backsplash Adhesive	06/12/2024	PLM	Non-ACM	ND	
242402954-0011	05A	Roof Above Kitchen	Roof Composite	06/12/2024	PLM	Non-ACM	ND	
242402954-0012	05B	Roof Above Kitchen	Roof Composite	06/12/2024	PLM	Non-ACM	ND	

NOTE: Bold samples are Asbestos Containing Materials (ACM). See limitations section for areas not inspected.

APPENDIX I

LABORATORY DATA



EMSL Analytical, Inc.

165 Gracey Avenue Meriden, CT 06451

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com/meridenlab@emsl.com>

EMSL Order: 242402954

Customer ID: ATC62

Customer PO: 11-81-0030

Project ID:

Attention: Chris Godfrey
Atlas Technical
73 William Franks Drive
West Springfield, MA 01089

Phone: (413) 781-0070

Fax: (413) 781-3734

Received Date: 06/13/2024 9:00 AM

Analysis Date: 06/19/2024

Collected Date: 06/12/2024

Project: Southbridge Senior Center Kitchen, 153 Chestnut St Southbridge MA 01550, Proj# 183CG24032

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
01A 242402954-0001	Kitchen - Wall block grout	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected
01B 242402954-0002	Kitchen - Wall block grout	Gray Non-Fibrous Homogeneous		8% Quartz 92% Non-fibrous (Other)	None Detected
02A 242402954-0003	Kitchen - Pipe Insulation	White Fibrous Homogeneous		73% Non-fibrous (Other)	20% Amosite 2% Chrysotile 5% Crocidolite
02B 242402954-0004	Kitchen - Pipe Insulation				Positive Stop (Not Analyzed)
02C 242402954-0005	Kitchen - Pipe Insulation				Positive Stop (Not Analyzed)
03A 242402954-0006	Kitchen - Pipe Fittings	White Fibrous Homogeneous		72% Non-fibrous (Other)	20% Amosite 2% Chrysotile 6% Crocidolite
03B 242402954-0007	Kitchen - Pipe Fittings				Positive Stop (Not Analyzed)
03C 242402954-0008	Kitchen - Pipe Fittings				Positive Stop (Not Analyzed)
04A 242402954-0009	Kitchen - White Backsplash Adhesive	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
04B 242402954-0010	Kitchen - White Backsplash Adhesive	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
05A 242402954-0011	Roof Above Kitchen - Roof Composite	Black/Yellow Fibrous Homogeneous	35% Cellulose 10% Glass	55% Non-fibrous (Other)	None Detected
05B 242402954-0012	Roof Above Kitchen - Roof Composite	Brown/Tan/Black Fibrous Heterogeneous	35% Cellulose 10% Glass	55% Non-fibrous (Other)	None Detected



EMSL Analytical, Inc.

165 Gracey Avenue Meriden, CT 06451

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com> / meridenlab@emsl.com

EMSL Order: 242402954

Customer ID: ATC62

Customer PO: 11-81-0030

Project ID:

Analyst(s)

Hailey Rangel (5)

Sara Poppa (3)

Danny Sandhu, Asbestos Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Meriden, CT NVLAP Lab Code 200700-0.

Initial report from: 06/20/2024 08:44:58

ATLAS

242402954

Asbestos Bulk Sample Chain-of-Custody

Project Name: Southbridge Senior Center Kitchen Project Address: 153 Chestnut St, Southbridge MA 0155Project Number: 183CG24032Project Manager: Chris GodfreySampled By: Craig ConnettResults To: Craig.Connett@Oneatlas.com / christopher.godfrey@oneatlas.comAnalysis Type: PLMTurnaround Time: 5 DayDate: 6/12/24Positive Stop Yes

No

Special Instructions or Comments: Samples OSA/B - Please separate all layers

Field ID	Sample Description	Location	Homogeneous Material
O1A	Wall Block Grout	Kitchen	O1
O1B	↓		O1
O2A	Pipe Insulation		O2
O2B	↓		O2
O2C	↓		O2
O3A	Pipe Fittings		O3
O3B	↓		O3
O3C	↓		O3
O4A	White Backsplash Adhesive	↓	O4
O4B	↓		O4
O5A	Roof Composite	Roof Above Kitchen	O5
O5B	↓	↓	O5
RECEIVED JUN 13 2024 By <u>DS</u> 08 9:00			

Relinquished By: [Signature] Date: 6/12/24

Received By: _____ Date: _____

Relinquished By: _____ Date: _____

Received By: _____ Date: _____

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

DRAFT AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

« Town of Southbridge »
« 41 Elm Street »
« Southbridge, MA 01550 »

BOND AMOUNT: \$ « »

PROJECT:

(Name, location or address, and Project number, if any)

« Southbridge Senior Center – Kitchen Hood Renovations »
« 153 Chestnut Street »
« Southbridge, MA 01550 »

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

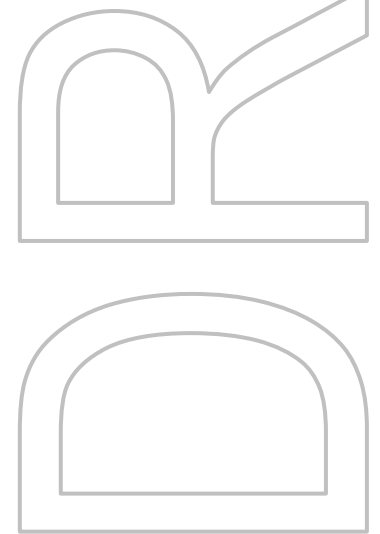
If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

Signed and sealed this « » day of « », « »

(Witness)

(Witness)

« »	
(Contractor as Principal)	(Seal)
« »	
(Title)	
« »	
(Surety)	(Seal)
« »	
(Title)	



FORM FOR GENERAL BID

TO: The town of Southbridge, Massachusetts (hereinafter called "Awarding Authority" or "Owner").

- A. The Undersigned (hereinafter referred as "Bidder"), proposes to furnish all labor and materials required for:

**Southbridge Senior Center
Kitchen Hood Renovations
153 Chestnut St, Southbridge, MA 01550**

In accordance with the accompanying Bidding and Contract Documents (Drawings and Specifications) prepared by the Architect, KAESTLE BOOS ASSOCIATES, INC., for the Contract Price specified below, subject to additions and deductions according to the terms of the specifications.

- B. ADDENDA: This Bid includes Addenda numbered _____

- C. CONTRACT PRICE:

**Note: All Information Must Be Written In Ink, In Words As Well As Figures.
In case of discrepancy, the amount shown in words will govern.**

\$ _____

(amount written in numbers)

(amount written in words)

- D. The Bidder hereby agrees to commence work under this contract in accordance with the phasing schedule as described in Division 01 Section titled "SUMMARY":
- E. The undersigned agrees that, if he is selected as General Contractor, he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this Bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of the Contract Price, the premiums for which are to be paid by the General Contractor and are included in the Contract Price.
- G. 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 all laws and regulations applicable to the award of the subcontracts subject to Section Forty-Four F, MGL 149.
- H. The undersigned hereby certifies that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of

said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

- I. The undersigned bidder hereby certifies, under the pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety. 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.
- J 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 Commonwealth of Massachusetts General Laws or any rule or regulations promulgated thereunder.

Name of Bidder: _____

Address: _____

Authorized Signature: _____

Title: _____

Date: _____

Telephone: _____

Fax: _____

E-Mail: _____

END OF DOCUMENT

STATEMENT OF NON-COLLUSION – GENERAL BIDDER

I, _____, _____, of _____
(Name) (Title) (General Contractor)

whose principal place of business is located at _____

do hereby certify that:

1. The proposed bid price has been arrived at independently, without collusion, consultation communication as to any other contractor or with any competitor.
2. The said bid price was not disclosed by the Contractor and was not knowingly discussed prior to the submission, directly or indirectly, to any other contractor or to any competitor.
3. No attempt was made by the Contractor to induce any other person, partnership or corporation to submit or note to submit a proposal for the purpose of restricting competition.
4. This bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this section the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business or legal entity.

Signed under the pains of perjury this _____ day of __, 20____.

Name of General Contractor

By: _____

Title: _____

Personally appeared the above named _____, and being duly sworn, deposed and says that he/she is the person named therein, and who signed the foregoing, and that the statements therein are true.

Notary Public

My commission expires: _____

END STATEMENT OF NON-COLLUSION

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

Foreign Corporation Certification

AFFIDAVIT OF COMPLIANCE
Form AF-4A 1/78

EXECUTIVE OFFICE FOR
ADMINISTRATION AND FINANCE

The Commonwealth of Massachusetts

_____ MASSACHUSETTS BUSINESS CORPORATION

_____ NON PROFIT CORPORATION

_____ FOREIGN (non-Massachusetts) Corporation

1. _____, _____ President _____ Clerk/Secretary of

_____ whose principal office is
(Name of Corporation)

located _____

do hereby certify that the above named Corporation has filed with the State Secretary all certificates and annual reports required by Chapter 156B, Section 109 (Business Corporation), by Chapter 181, Section 4 (Foreign Corporation), or by Chapter 180, Section 26A (non-profit Corporation) of the Massachusetts General Laws.

SIGNED UNDER THE PENALTIES OF PERJURY THIS _____ day of _____, 20____.

Signature of responsible Corporate Officer _____

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

CERTIFICATION OF COMPLIANCE WITH TAX LAWS

Pursuant to Commonwealth of Massachusetts General Laws, Chapter 62C, Section 49A, I certify under the pains and penalties of perjury that,

(Bidder)

has filed all Commonwealth of Massachusetts state tax returns, has complied with all Commonwealth of Massachusetts laws relating to taxes, and has paid all Commonwealth of Massachusetts State Taxes required under law.

By: _____
(signature)

(name)

Federal Tax I.D. No. _____

END OF DOCUMENT

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

**CONTRACT FOR
COMPLETION OF CERTAIN PUBLIC WORKS or BUILDING
IMPROVEMENTS/MAINTENANCE/REPAIRS
IN THE TOWN OF SOUTHBRIDGE**

** Not to be used for building projects exceeding \$100,000 in value.*

An agreement made this ## day of November, 2024, by and between the **Town of Southbridge**, a duly organized Massachusetts municipal corporation with a principal address of 41 Elm Street, MA 01550 (the “Town”) and **CONTRACTOR NAME** with a business address of ## Street, Town State. Zip ##### (the “Contractor”).

WHEREAS, the Town [*select appropriate box*]:

- ☐ for a building project estimated to cost less than \$10,000, utilized sound business practices to select a contractor;
- ☐ for a building project estimated to cost between \$10,000 and \$50,000, solicited written responses from contractors through a public notification process in accordance with the procedures set forth in MGL c. 149, §44A(2)(B);
- ☒ for a building project estimated to cost between \$25,000 and \$100,000, solicited bids in accordance with the procedures set forth MGL c.30, §39M;
- ☐ for a public works project estimated to cost \$10,000 or less, solicited three quotes from qualified contractors; or
- ☐ for a public work project estimated to cost more than \$10,000, solicited bids in accordance with the procedures set forth in MGL c. 30, §39M
- ☐ for an energy conservation project to cost \$100,000 or less, in accordance with MGL c. 25A, §14

for the completion of **Senior Center Kitchen Hood Renovations** (the “Project”);

WHEREAS, the Contractor submitted a bid/quote to complete the Project that was acceptable to the Town; and

WHEREAS, by entering this Contract, the Contractor represents to the Town that it has the skill, qualifications, experience, equipment and manpower necessary to complete the Project in accordance with the terms and requirements set forth herein.

NOW THEREFORE, in consideration of the mutual exchange of promises set forth below and for other good and valuable consideration, the Town and the Contractor hereby agree as follows:

1. Scope of Work: The Contractor shall perform all work required by the specifications entitled: “Removal and Disposal of Existing Exterior Doors and Suppl and Installation of New Exterior Doors at the Southbridge Community Center,” dated July 26, 2024, and attached hereto as Exhibit A (the “Project”).
2. Commencement and Completion of the Project: The Contractor shall commence work under this Contract immediately from the date of execution of this Contract, which date shall be the Date of Commencement, unless an alternative date is approved in writing by the Town. **The Contractor shall obtain Substantial Completion of the Project within Thirty (90) calendar days from the Date of Commencement. Time is of the essence for the completion of the Project.**
3. Contract Sum:
 - a. The Town shall pay the Contractor, in current funds, for the performance of the work, subject to Additions and Deductions by approved Change Order(s) (if any), the Contract Sum of:

Contract Amount

(words)

(\$##,###.00).

- b. The amount stipulated as the Contract Sum shall represent the maximum amount payable by the Town for all costs associated with the completion of the Project, such costs to include items such as consulting fees, clerical support, travel costs, printing costs, telephone costs, and other incidental costs associate with the completion of the Project.
4. Appropriation: This Contract is subject to an appropriation being available therefore.
5. Payment:
 - a. The Contractor shall submit written invoices upon completion of the project and every invoice shall indicate the work completed. The Contractor shall supply any additional information as may reasonably be required by the Town to clarify, substantiate or otherwise explain the work completed or the amount payable.
6. The Contract Documents: The following, together with this Contract, form the Contract and all are as fully a part of the Contract as if attached to this Contract or herein repeated: the Advertisement of the Invitation for Bids, the Bidding Documents, including the Contractor’s completed Bid Form, the Contract Forms, the Statutory Provisions for Public Construction in Massachusetts (attached hereto as Exhibit B) and the Work/Project Specifications (if any).

7. Insurance:

- a. Prior to commencing any work, the Contractor shall deliver to the Town/Town evidence of insurance coverage in the amounts set forth in the Bidding Documents or, if not so specified, as follows:
 - i. General Liability with minimum limits of \$1,000,000 per occurrence/\$2,000,000 aggregate written on an occurrence basis.
 - ii. Auto Liability (including owned, hired and non-owned autos): \$1,000,000 combined single limit (each accident).
 - iii. Excess Liability: \$2,000,000 minimum limits in excess of underlying limits. The umbrella shall be no more restrictive than underlying coverage.
 - iv. Worker's Compensation and Employer's Liability per Commonwealth of Massachusetts statutory limits.
- b. The Contractor shall provide the Town with suitable evidence of the required insurance coverage prior to commencement of any work. This insurance shall be written by a company licensed to do business in the state of Massachusetts with a minimum A.M. Best rating of A- VII. Each policy shall provide for written notification to the Town at least thirty (30) days prior to termination, material change or restrictive amendments. The coverage's and limits are to be considered minimum requirements under this contract and in no way limit the liability of the Contractor.

8. Standard of Performance: The work performed under this Contract shall be rendered in conformity with the standards of the trade and shall be professional and of the highest fabrication and installation quality in all respects. Substandard fabrication and installation quality shall be deemed a breach of this Contract.

9. Guarantees:

- a. The Contractor guarantees the work under this Contract and the materials furnished by it for use in connection therewith to be free from defects or flaws for one year after the completion of the Contract. It is expressly understood, however, that this guarantee provision shall not absolve the Contractor from any liability to the Town arising out of a failure to substantially comply with the terms of the Contract.
- b. If at any time within said guaranty period, any part of the work constructed under the terms of this Contract shall in the opinion of the Town require repair due to defective work or materials furnished by the Contractor, the Town may notify the Contractor in writing to make the required repairs. If the Contractor shall neglect to start such repairs within ten days of the date of receipt of notice thereof and to complete the same to the satisfaction of the Town with

reasonable dispatch, then the Town may employ other persons to make such repairs. The Town shall charge the expense thereof to the Contractor and may use any moneys still retained to pay for the same, and if such sum is insufficient, the Contractor shall be obligated to pay the balance thereof.

10. Indemnification: Notwithstanding the availability and policy limits of any insurance, the Contractor hereby agrees to defend, indemnify and hold harmless the Town, its officers and employees ("Indemnified Parties") against any claims made or legal actions brought against an Indemnified Party(ies) by any person or entity as a result of or arising from injuries, damages, expenses and losses actually or allegedly incurred by such a person or entity ("Liabilities") arising out of or relating to the Contractor's performance or failure to perform pursuant to this Contract, except where the Liabilities are the result of the Indemnified Party's own direct and sole negligence. This obligation shall survive the termination, completion or expiration of this Contract. The Contractor shall promptly notify the Town of any claim or action brought in connection with this Contract and thereupon shall promptly take over and defend any such claim or action.

11. Remedies of the Town:

- a. If the Contractor shall provide services in a manner which are not to the satisfaction of the Town, the Town may request that the Contractor redo the work at no additional cost to the Town until approved by the Town. If the Contractor shall fail to provide such services or shall provide services which are not satisfactory to the Town, in the alternative, may make any reasonable purchase or contract to purchase services in substitution of those due from the Contractor. The Town may deduct the cost of any substitute contract or nonperformance of services together with incidental and consequential damages from the contract price and shall withhold such damages from sums due to become due. If after reasonable effort, the Town is unable to make any reasonable purchase or contract in substitution thereof, the Town may require the Contractor to deliver all completed work to date.
- b. If the damages sustained by the Town as determined by the Town exceed sums due or to become due, the Contractor shall pay the difference to the Town upon demand.
- c. This contract may be terminated at any time for the convenience of the Town at the option of the Town by delivering or mailing to the Contractor at the Contractor's business address a written notice of termination setting forth the date, not less than seven (7) days after the date of such delivery or mailing; when such termination for convenience occurs, the Contractor shall be compensated for all services rendered to the effective date of said termination in accordance with the rates of compensation specified in this contract.

12. Amendments by Change Order: This Contract may be amended by a written Change Order, duly executed by the parties hereto. No modifications, waiver or alternation of

the Contract or any term herein shall be enforceable unless it is in writing, as a Change Order, and duly executed by both the Town and the Contractor.

13. Assignment: The Contractor shall not assign, subcontract, or in any way transfer any interest in this Contract without the prior written consent of the Town.
14. Massachusetts Law: This Contract shall be construed in accordance with and shall be governed by the laws of the Commonwealth of Massachusetts. Any provision of this Contract or the Contract Documents deemed to be inconsistent with state law shall be given no force or effect. In the event that a provision is deemed to be unlawful, it shall be severed from the Contract, and at the option of the Town, the balance of the provision and/or the Contract shall continue in full force and effect.
15. Prevailing Wages: This Contract is subject to the Massachusetts Prevailing Wage Statute, M.G.L. c.149, §27 and the Contractor shall pay applicable wages as set forth in the schedule of wages included in the Bidding Documents. The signed Weekly Statement of Compliance and Weekly Certified Payroll Report must be submitted to the Town along with the invoice for payment upon completion of the project.
16. REAP Certification: Pursuant to M.G.L. c.62C, §49A, the individual signing this Contract on behalf of the Contractor certifies, under the penalties of perjury, that, to the best of his/her knowledge and belief, the Contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.
17. Conflict of Interest: The Contractor's attention is called to M.G.L. c.268A. The Contractor shall not act in collusion with any Town officer, agent, employee, or any party regarding this Contract, nor shall the Contractor make gifts regarding this Contract or any other matter in which the Town has a direct or substantial interest.
18. Independent Contractor: The Town and the Contractor intend that the relationship established between them pursuant to this Contract shall be that of client and independent contractor. No agent, employee, or servant of the Contractor shall be or shall be deemed to be an employee, agent or servant of the Town. For the limited purposes of M.G.L. c.268A, the Contractor shall be considered a "municipal employee."
19. Notices: All notices under this Contract shall be in writing and shall be deemed received (i) upon delivery in hand, (ii) one business day after being sent by reputable overnight delivery or courier service providing for receipted delivery, or (iii) two business days after being sent by certified or registered mail, return receipt requested, postage prepaid, or (iv) the same business day after being sent by facsimile during business hours of the Boylston Town Hall; and addressed as follows:

To the Town:

Town of Southbridge
Attention John D. Jovan, Jr., Town Manager
41 Elm Street
Southbridge, MA 01550

To the Contractor:

Contractor Name
Attn: Project Manager
Street
Town, ST #####

20. Entire Contract: This Contract constitutes the entire Contract between the parties with respect to the matters addressed herein.

IN WITNESS WHEREOF, the Parties hereto intending to be legally bound have caused their duly authorized representatives to set hands and seals on the dates set forth below.

CONTACTOR:

By: _____
Name:

Date: _____

Title: _____

[Attach evidence of Corporate Authority]

TOWN:

Town of Southbridge

By: _____
Name: John D. Jovan Jr.

Date: _____

Title: Town Manager

Certification Pursuant to M.G.L. c.44, §31C:

Funds for this Contract are available
in Account No. _____

By: _____

[FOR A BUILDING PROJECT OR A PUBLIC WORKS PROJECT ESTAMITED TO COST MORE THAN \$25,000, the attached form of PAYMENT BOND must be provided by a company licensed to do business as a surety in Massachusetts, and in an amount no less than 50% of the total Contract Sum or a greater amount if so required by Bid Specifications/Requirements]

CONTRACTOR'S PAYMENT BOND

[Required for Building and Public Works Projects over \$25,000]

PROJECT: _____

PROJECT LOCATION: _____, MASSACHUSETTS

TOWN: TOWN OF SOUTHBRIDGE, MASSACHUSETTS

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____

as Principal, and _____

Surety, are held and firmly bound unto the Town,

as Obligee, in the sum of

_____ Dollars,
(words)

\$ _____
(figures)

to be paid to the Obligee, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Whereas, the said Principal has made a Contract with the Obligee, bearing the date of _____, 20____, for the completion of the Project.

The conditions of this obligation are such that, if the Principal and all Subcontractors under said Contract shall pay for all labor performed or furnished and for all materials used or employed in said Contract and in all duly authorized modifications, alterations, extensions of time, changes, or additions to said Contract that may be made, notice to the Surety of such modifications, alterations, extensions of time, changes, or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, provisions of M.G.L. c.30, §39A, and M.G.L. c.149, §29, as amended, then this obligation shall become void; otherwise, it shall remain in full force and virtue.

In witness whereof, the Principal and Surety have set their hands and seals
this

_____ day of _____, 20__.

PRINCIPAL

SURETY

(Name and Seal)

(Attorney-in-Fact – Seal)

(Title)

Attest: _____

Attest: _____

The rate for this Bond is _____% for the first \$_____ and
_____ % for the next \$_____. The total Premium for this
Bond is \$_____.

END OF DOCUMENT

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

VII. Reference Form

- A. Bidder must provide three (3) references for which bidder have provided similar products and services within the last five years. **Failure to provide the information requested will be considered non-responsive and the bid rejected.**

BIDDER: _____

IFB Title: Southbridge Sr. Center Kitchen Exhaust

Bidder must provide references for:

Reference: _____ Contact: _____
Address: _____ Phone: _____
_____ Fax: _____

Description and date(s) of supplies or services provided:

Reference: _____ Contact: _____
Address: _____ Phone: _____
_____ Fax: _____

Description and date(s) of supplies or services provided:

Reference: _____ Contact: _____
Address: _____ Phone: _____
_____ Fax: _____

Description and date(s) of supplies or services provided:

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

PERFORMANCE BOND

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

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

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

_____ hereinafter called the "Surety" and licensed by the State Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the **Town of Southbridge**, Massachusetts, hereinafter called "Owner", in the penal sum of _____ Dollars (\$ _____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal has entered into a certain contract with the Owner (the "Construction Contract"), dated the _____ day of _____, 2016, for the construction described as follows:

Southbridge Senior Center Kitchen Hood Renovations – Southbridge, MA

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of the Construction Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under the Construction Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise, this obligation shall remain in full force and effect.

PROVIDED, FURTHER, that the Surety's obligation under this Bond shall arise after (1) the Owner has declared the Principal in default of the Construction Contract or any provision thereof, or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to execute the work consistent with, and in conformance to, the Construction Contract (collectively referred to as a "Contractor Default"). The determination of a Contractor Default shall be made solely by the Owner. The Owner need not terminate the Construction Contract to declare a Contractor Default or to invoke its rights under this Bond.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall immediately take one of following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract; (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the

Owner in performing and completing the work of the Construction Contract. Surety will keep Owner reasonably informed of the progress, status and results of its investigation of any claim of the Owner.

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

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

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

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Contract or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument is executed in ____ () counterparts, each one of which shall be deemed an original, this the _____ day of _____, 2024.

ATTEST:

		Principal
_____	By	_____
(Principal Secretary)		_____

		(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

(Address-Zip Code)

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

ATTEST:

_____	By	_____ Surety
		_____ (Attorney-in-Fact)
		_____ (Address-Zip Code)
_____ Witness as to Surety	(SEAL)	

_____ (Address-Zip Code)		

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

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SUBCONTRACT

THIS AGREEMENT made this _____ day of _____, 20__

by and between _____

- ☐ a corporation organized and existing under the laws of _____
☐ a partnership consisting of _____
☐ an individual doing business as _____

hereinafter called the "Contractor", and _____

- ☐ a corporation organized and existing under the laws of _____
☐ a partnership consisting of _____
☐ an individual doing business as _____

hereinafter called the "Subcontractor",

WITNESSETH that the Contractor and the Subcontractor, for the considerations hereafter named, agree as follows:

1. The Subcontractor agrees to furnish all labor and materials required for the completion of all work specified in Section No(s) _____ of the Specifications for _____ and the Drawings referred to (Name of Subtrade) therein and Addenda No. ____, ____, ____, ____, ____, ____, for construction of:

as prepared by the Architect, KAESTLE BOOS ASSOCIATES INC., 16 Chestnut Street, Suite 301, Foxborough, MA 02035 for the sum of _____

_____ Dollars (\$ _____)
and the Contractor agrees to pay the Subcontractor said sum for said work. This price includes the following alternates (and other items set forth in the sub-bid):

Alternate No(s): ____, ____, ____.

- (a) The Subcontractor agrees to be bound to the Contractor by the terms of the hereinbefore described Drawings, Specifications (including all General Conditions stated therein) and

Addenda and to assume to the Contractor all the obligations and responsibilities that the Contractor by those documents assumes to the Southbridge, MA hereinafter called the "Awarding Authority", except to the extent that provisions contained therein are by their terms or by law applicable only to the Contractor.

- (b) The Contractor agrees to be bound to the Subcontractor by the terms of the hereinbefore described documents and to assume to the Subcontractor all the obligations and responsibilities that the Awarding Authority by the terms of the hereinbefore described-documents assumes to the Contractor, except to the extent that provisions contained therein are by their terms or by law applicable only to the Awarding Authority.
2. The Contractor agrees to begin, prosecute, and complete the entire Work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute, and complete the work described in this Subcontract; and, in consideration thereof, upon notice from the Contractor, either oral or in writing, the Subcontractor agrees to begin, prosecute, and complete the work described in this Subcontract in an orderly manner and with due consideration to the date or time specified by the Awarding Authority for the completion of the entire Work.
 3. The Subcontractor agrees to furnish to the Contractor within a reasonable time after the execution of this Subcontract, evidence of Workmen's Compensation Insurance as required by law, and evidence of Public Liability and Property Damage Insurance of the type and in limits required to be furnished to the Awarding Authority by the Contractor.
 4. The Contractor agrees that no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten (10) days of the calendar month following that in which the claim originated.
 5. This Agreement is contingent upon the execution of a General Contract between the Contractor and the Awarding Authority for the complete Work.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above-written.

SEAL

ATTEST _____

(Name of Subcontractor)

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

SEAL

ATTEST _____

(Name of Contractor)

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

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

END OF DOCUMENT

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

CERTIFICATE OF AUTHORITY
(Corporations Only)

At a duly authorized meeting of the Board of Directors of the

_____ held on _____ it was
(Name of Corporation) (Date)

VOTED, that

(Name of Officer)

of this company, be and he/she hereby is authorized to execute contracts and bonds in the name and on behalf of said company, and affix its corporate seal hereto; and such execution of any contract or obligation in this company's name on its behalf by such

_____ under seal of the company, shall be
(Officer)

valid and binding upon this company.

A True Copy,

Attested By: _____

Title: _____

Name of Company: _____

Street Address: _____

City/Town/Zip Code: _____

Date: _____

I hereby certify that I am the clerk/secretary of _____
(Company Name)

that _____ is the duly elected _____
(Name of Officer) (Title)

of said company, and that the above vote has not been amended or rescinded and remains in full force and effect as the date of this contract.

(Clerk/Secretary)

Corporate Seal

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK



MITT ROMNEY
Governor
KERRY HEALEY
Lieutenant Governor

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
www.state.ma.us/dos

JANE C. EDMONDS
Director
ROBERT J. PREZIOSO
Deputy Director

The Massachusetts Prevailing Wage Law
M.G.L. ch. 149, §§ 26 - 27

NOTICE TO AWARDING AUTHORITIES

- ' The enclosed wage schedule applies only to the specific project listed at the top and will remain in effect for the duration of the project.
- ' You should request an updated wage schedule from the Division of Occupational Safety if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- ' The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- ' Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

- ' The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.
- ' The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- ' The enclosed wage schedule applies to all phases of the project including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.
- ' All apprentices must be registered with the Massachusetts Division of Apprentice Training in order to be paid at the reduced apprentice rates. If a worker is not registered with the Division of Apprentice Training, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call (617) 727-3486 or write to the Division of Apprentice Training, 399 Washington Street, 4th Floor, Boston, MA 02108.

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK



MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

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

Prevailing Wage Rates

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

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Town of Southbridge

Contract Number:

City/Town: SOUTHBRIDGE

Description of Work: The addition of a new commercial kitchen hood and fan.

Job Location: 153 Chestnut St, Southbridge, MA 01550

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$39.95	\$15.07	\$18.67	\$0.00	\$73.69
	12/01/2024	\$39.95	\$15.07	\$20.17	\$0.00	\$75.19
	01/01/2025	\$39.95	\$15.57	\$20.17	\$0.00	\$75.69
	06/01/2025	\$40.95	\$15.57	\$20.17	\$0.00	\$76.69
	12/01/2025	\$40.95	\$15.57	\$21.78	\$0.00	\$78.30
	01/01/2026	\$40.95	\$16.17	\$21.78	\$0.00	\$78.90
	06/01/2026	\$41.95	\$16.17	\$21.78	\$0.00	\$79.90
	12/01/2026	\$41.95	\$16.17	\$23.52	\$0.00	\$81.64
	01/01/2027	\$41.95	\$16.77	\$23.52	\$0.00	\$82.24
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.02	\$15.07	\$18.67	\$0.00	\$73.76
	12/01/2024	\$40.02	\$15.07	\$20.17	\$0.00	\$75.26
	01/01/2025	\$40.02	\$15.57	\$20.17	\$0.00	\$75.76
	06/01/2025	\$41.02	\$15.57	\$20.17	\$0.00	\$76.76
	12/01/2025	\$41.02	\$15.57	\$21.78	\$0.00	\$78.37
	01/01/2026	\$41.02	\$16.17	\$21.78	\$0.00	\$78.97
	06/01/2026	\$42.02	\$16.17	\$21.78	\$0.00	\$79.97
	12/01/2026	\$42.02	\$16.17	\$23.52	\$0.00	\$81.71
	01/01/2027	\$42.02	\$16.77	\$23.52	\$0.00	\$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.14	\$15.07	\$18.67	\$0.00	\$73.88
	12/01/2024	\$40.14	\$15.07	\$20.17	\$0.00	\$75.38
	01/01/2025	\$40.14	\$15.57	\$20.17	\$0.00	\$75.88
	06/01/2025	\$41.14	\$15.57	\$20.17	\$0.00	\$76.88
	12/01/2025	\$41.14	\$15.57	\$21.78	\$0.00	\$78.49
	01/01/2026	\$41.14	\$16.17	\$21.78	\$0.00	\$79.09
	06/01/2026	\$42.14	\$16.17	\$21.78	\$0.00	\$80.09
	12/01/2026	\$42.14	\$16.17	\$23.52	\$0.00	\$81.83
	01/01/2027	\$42.14	\$16.77	\$23.52	\$0.00	\$82.43
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
	For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"					
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	06/01/2024	\$41.80	\$14.50	\$11.05	\$0.00	\$67.35
	12/01/2024	\$42.80	\$14.50	\$11.05	\$0.00	\$68.35
	06/01/2025	\$43.80	\$14.50	\$11.05	\$0.00	\$69.35
	12/01/2025	\$44.80	\$14.50	\$11.05	\$0.00	\$70.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
	For apprentice rates see "Apprentice- LABORER"					
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
	For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"					
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
	For apprentice rates see "Apprentice- OPERATING ENGINEERS"					
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
	For apprentice rates see "Apprentice- OPERATING ENGINEERS"					

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2024

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

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	08/01/2024	\$62.36	\$11.49	\$22.90	\$0.00	\$96.75
BRICKLAYERS LOCAL 3 (WORCESTER)	02/01/2025	\$63.66	\$11.49	\$22.90	\$0.00	\$98.05
	08/01/2025	\$65.81	\$11.49	\$22.90	\$0.00	\$100.20
	02/01/2026	\$67.16	\$11.49	\$22.90	\$0.00	\$101.55
	08/01/2026	\$69.36	\$11.49	\$22.90	\$0.00	\$103.75
	02/01/2027	\$70.76	\$11.49	\$22.90	\$0.00	\$105.15

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.18	\$11.49	\$22.90	\$0.00	\$65.57
2	60	\$37.42	\$11.49	\$22.90	\$0.00	\$71.81
3	70	\$43.65	\$11.49	\$22.90	\$0.00	\$78.04
4	80	\$49.89	\$11.49	\$22.90	\$0.00	\$84.28
5	90	\$56.12	\$11.49	\$22.90	\$0.00	\$90.51

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.83	\$11.49	\$22.90	\$0.00	\$66.22
2	60	\$38.20	\$11.49	\$22.90	\$0.00	\$72.59
3	70	\$44.56	\$11.49	\$22.90	\$0.00	\$78.95
4	80	\$50.93	\$11.49	\$22.90	\$0.00	\$85.32
5	90	\$57.29	\$11.49	\$22.90	\$0.00	\$91.68

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$46.63	\$9.65	\$18.22	\$0.00	\$74.50
	12/01/2024	\$48.10	\$9.65	\$18.22	\$0.00	\$75.97
	06/01/2025	\$49.60	\$9.65	\$18.22	\$0.00	\$77.47
	12/01/2025	\$51.10	\$9.65	\$18.22	\$0.00	\$78.97
	06/01/2026	\$52.65	\$9.65	\$18.22	\$0.00	\$80.52
	12/01/2026	\$54.15	\$9.65	\$18.22	\$0.00	\$82.02
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.48	\$9.65	\$18.22	\$0.00	\$73.35
	12/01/2024	\$46.95	\$9.65	\$18.22	\$0.00	\$74.82
	06/01/2025	\$48.45	\$9.65	\$18.22	\$0.00	\$76.32
	12/01/2025	\$49.95	\$9.65	\$18.22	\$0.00	\$77.82
	06/01/2026	\$51.50	\$9.65	\$18.22	\$0.00	\$79.37
	12/01/2026	\$53.00	\$9.65	\$18.22	\$0.00	\$80.87
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.81	\$9.65	\$18.22	\$0.00	\$73.68
	12/01/2024	\$47.28	\$9.65	\$18.22	\$0.00	\$75.15
	06/01/2025	\$48.78	\$9.65	\$18.22	\$0.00	\$76.65
	12/01/2025	\$50.28	\$9.65	\$18.22	\$0.00	\$78.15
	06/01/2026	\$51.83	\$9.65	\$18.22	\$0.00	\$79.70
	12/01/2026	\$53.33	\$9.65	\$18.22	\$0.00	\$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	09/01/2024	\$48.37	\$9.83	\$19.97	\$0.00	\$78.17
	03/01/2025	\$49.62	\$9.83	\$19.97	\$0.00	\$79.42
	09/01/2025	\$50.87	\$9.83	\$19.97	\$0.00	\$80.67
	03/01/2026	\$52.12	\$9.83	\$19.97	\$0.00	\$81.92
	09/01/2026	\$53.37	\$9.83	\$19.97	\$0.00	\$83.17
	03/01/2027	\$54.62	\$9.83	\$19.97	\$0.00	\$84.42

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
2	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
3	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
4	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
5	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
6	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
7	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77
8	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$22.33	\$9.83	\$1.73	\$0.00	\$33.89
2	45	\$22.33	\$9.83	\$1.73	\$0.00	\$33.89
3	55	\$27.29	\$9.83	\$3.40	\$0.00	\$40.52
4	55	\$27.29	\$9.83	\$3.40	\$0.00	\$40.52
5	70	\$34.73	\$9.83	\$16.51	\$0.00	\$61.07
6	70	\$34.73	\$9.83	\$16.51	\$0.00	\$61.07
7	80	\$39.70	\$9.83	\$18.24	\$0.00	\$67.77
8	80	\$39.70	\$9.83	\$18.24	\$0.00	\$67.77

Notes:

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME	10/01/2024	\$26.65	\$7.02	\$4.80	\$0.00	\$38.47
CARPENTERS-ZONE 3 (Wood Frame)	10/01/2025	\$27.75	\$7.02	\$4.80	\$0.00	\$39.57
	10/01/2026	\$28.85	\$7.02	\$4.80	\$0.00	\$40.67
All Aspects of New Wood Frame Work						

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.99	\$7.02	\$0.00	\$0.00	\$23.01
2	60	\$15.99	\$7.02	\$0.00	\$0.00	\$23.01
3	65	\$17.32	\$7.02	\$1.00	\$0.00	\$25.34
4	70	\$18.66	\$7.02	\$1.00	\$0.00	\$26.68
5	75	\$19.99	\$7.02	\$4.80	\$0.00	\$31.81
6	80	\$21.32	\$7.02	\$4.80	\$0.00	\$33.14
7	85	\$22.65	\$7.02	\$4.80	\$0.00	\$34.47
8	90	\$23.99	\$7.02	\$4.80	\$0.00	\$35.81

Effective Date - 10/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$16.65	\$7.02	\$0.00	\$0.00	\$23.67
2	60	\$16.65	\$7.02	\$0.00	\$0.00	\$23.67
3	65	\$18.04	\$7.02	\$1.00	\$0.00	\$26.06
4	70	\$19.43	\$7.02	\$1.00	\$0.00	\$27.45
5	75	\$20.81	\$7.02	\$4.80	\$0.00	\$32.63
6	80	\$22.20	\$7.02	\$4.80	\$0.00	\$34.02
7	85	\$23.59	\$7.02	\$4.80	\$0.00	\$35.41
8	90	\$24.98	\$7.02	\$4.80	\$0.00	\$36.80

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$18.52/ 3&4 \$21.07/ 5&6 \$28.70/ 7&8 \$31.26

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (WORCESTER)	01/01/2024	\$49.33	\$13.00	\$23.57	\$1.30	\$87.20

Apprentice - CEMENT MASONRY/PLASTERING - Worcester

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.67	\$13.00	\$15.93	\$0.00	\$53.60
2	60	\$29.60	\$13.00	\$18.57	\$1.30	\$62.47
3	65	\$32.06	\$13.00	\$19.57	\$1.30	\$65.93
4	70	\$34.53	\$13.00	\$20.57	\$1.30	\$69.40
5	75	\$37.00	\$13.00	\$21.57	\$1.30	\$72.87
6	80	\$39.46	\$13.00	\$22.57	\$1.30	\$76.33
7	90	\$44.40	\$13.00	\$23.57	\$1.30	\$82.27

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$57.15	\$15.30	\$16.40	\$0.00	\$88.85
	12/01/2024	\$58.63	\$15.30	\$16.40	\$0.00	\$90.33
	06/01/2025	\$59.96	\$15.30	\$16.40	\$0.00	\$91.66
	12/01/2025	\$61.43	\$15.30	\$16.40	\$0.00	\$93.13
	06/01/2026	\$62.76	\$15.30	\$16.40	\$0.00	\$94.46
	12/01/2026	\$64.24	\$15.30	\$16.40	\$0.00	\$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.23	\$9.95	\$0.00	\$0.00	\$39.18
2	55	\$32.15	\$9.95	\$6.66	\$0.00	\$48.76
3	60	\$35.08	\$9.95	\$7.26	\$0.00	\$52.29
4	65	\$38.00	\$9.95	\$7.87	\$0.00	\$55.82
5	70	\$40.92	\$9.95	\$20.32	\$0.00	\$71.19
6	75	\$43.85	\$9.95	\$20.93	\$0.00	\$74.73
7	80	\$46.77	\$9.95	\$21.53	\$0.00	\$78.25
8	90	\$52.61	\$9.95	\$22.74	\$0.00	\$85.30

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN	06/10/2024	\$45.53	\$9.65	\$18.40	\$0.00	\$73.58
LABORERS - ZONE 2	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 2	06/10/2024	\$46.53	\$9.65	\$18.40	\$0.00	\$74.58
	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS LABORERS - ZONE 2	06/10/2024	\$46.28	\$9.65	\$18.40	\$0.00	\$74.33
	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER LABORERS - ZONE 2	06/10/2024	\$46.53	\$9.65	\$18.40	\$0.00	\$74.58
	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR LABORERS - ZONE 2	06/10/2024	\$46.28	\$9.65	\$18.40	\$0.00	\$74.33
	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	06/10/2024	\$45.53	\$9.65	\$18.40	\$0.00	\$73.58
	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34

Apprentice - *ELECTRICIAN - Local 96*

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.82	\$13.99	\$0.56	\$0.00	\$33.37
2	45	\$21.17	\$13.99	\$0.64	\$0.00	\$35.80
3	48	\$22.58	\$13.99	\$15.79	\$0.00	\$52.36
4	55	\$25.88	\$13.99	\$16.26	\$0.00	\$56.13
5	65	\$30.58	\$13.99	\$16.91	\$0.00	\$61.48
6	80	\$37.64	\$13.99	\$17.90	\$0.00	\$69.53

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.26	\$14.98	\$0.58	\$0.00	\$34.82
2	45	\$21.67	\$14.98	\$0.65	\$0.00	\$37.30
3	48	\$23.12	\$14.98	\$16.09	\$0.00	\$54.19
4	55	\$26.49	\$14.98	\$16.57	\$0.00	\$58.04
5	65	\$31.30	\$14.98	\$17.25	\$0.00	\$63.53
6	80	\$38.53	\$14.98	\$18.26	\$0.00	\$71.77

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2024	\$61.98	\$16.18	\$20.96	\$0.00	\$99.12
ELEVATOR CONSTRUCTORS LOCAL 41	01/01/2025	\$62.83	\$16.28	\$21.36	\$0.00	\$100.47
	01/01/2026	\$63.68	\$16.38	\$21.76	\$0.00	\$101.82
	01/01/2027	\$64.53	\$16.48	\$22.16	\$0.00	\$103.17

Apprentice - ELEVATOR CONSTRUCTOR - Local 41

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.99	\$16.18	\$0.00	\$0.00	\$47.17
2	55	\$34.09	\$16.18	\$20.96	\$0.00	\$71.23
3	65	\$40.29	\$16.18	\$20.96	\$0.00	\$77.43
4	70	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
5	80	\$49.58	\$16.18	\$20.96	\$0.00	\$86.72

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.42	\$16.28	\$0.00	\$0.00	\$47.70
2	55	\$34.56	\$16.28	\$21.36	\$0.00	\$72.20
3	65	\$40.84	\$16.28	\$21.36	\$0.00	\$78.48
4	70	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
5	80	\$50.26	\$16.28	\$21.36	\$0.00	\$87.90

Notes:

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER	01/01/2024	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
ELEVATOR CONSTRUCTORS LOCAL 41	01/01/2025	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
	01/01/2026	\$44.58	\$16.38	\$21.76	\$0.00	\$82.72
	01/01/2027	\$45.17	\$16.48	\$22.16	\$0.00	\$83.81

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

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

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	05/01/2024	\$50.79	\$15.00	\$16.40	\$0.00	\$82.19
OPERATING ENGINEERS LOCAL 4	11/01/2024	\$52.08	\$15.00	\$16.40	\$0.00	\$83.48
	05/01/2025	\$53.52	\$15.00	\$16.40	\$0.00	\$84.92
	11/01/2025	\$54.81	\$15.00	\$16.40	\$0.00	\$86.21
	05/01/2026	\$56.25	\$15.00	\$16.40	\$0.00	\$87.65
	11/01/2026	\$57.54	\$15.00	\$16.40	\$0.00	\$88.94
	05/01/2027	\$58.97	\$15.00	\$16.40	\$0.00	\$90.37

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2024	\$52.37	\$15.00	\$16.40	\$0.00	\$83.77
	11/01/2024	\$53.67	\$15.00	\$16.40	\$0.00	\$85.07
	05/01/2025	\$55.12	\$15.00	\$16.40	\$0.00	\$86.52
	11/01/2025	\$56.42	\$15.00	\$16.40	\$0.00	\$87.82
	05/01/2026	\$57.87	\$15.00	\$16.40	\$0.00	\$89.27
	11/01/2026	\$59.17	\$15.00	\$16.40	\$0.00	\$90.57
	05/01/2027	\$60.62	\$15.00	\$16.40	\$0.00	\$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2024	\$24.91	\$15.00	\$16.40	\$0.00	\$56.31
	11/01/2024	\$25.67	\$15.00	\$16.40	\$0.00	\$57.07
	05/01/2025	\$26.52	\$15.00	\$16.40	\$0.00	\$57.92
	11/01/2025	\$27.28	\$15.00	\$16.40	\$0.00	\$58.68
	05/01/2026	\$28.13	\$15.00	\$16.40	\$0.00	\$59.53
	11/01/2026	\$28.89	\$15.00	\$16.40	\$0.00	\$60.29
	05/01/2027	\$29.74	\$15.00	\$16.40	\$0.00	\$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$45.23	\$15.30	\$16.40	\$0.00	\$76.93
	12/01/2024	\$46.41	\$15.30	\$16.40	\$0.00	\$78.11
	06/01/2025	\$47.47	\$15.30	\$16.40	\$0.00	\$79.17
	12/01/2025	\$48.64	\$15.30	\$16.40	\$0.00	\$80.34
	06/01/2026	\$49.70	\$15.30	\$16.40	\$0.00	\$81.40
	12/01/2026	\$50.88	\$15.30	\$16.40	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$27.01	\$9.65	\$17.80	\$0.00	\$54.46
	12/01/2024	\$27.01	\$9.65	\$17.80	\$0.00	\$54.46
	06/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	12/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	06/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
	12/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE II</i>	03/01/2024	\$49.47	\$8.83	\$20.27	\$0.00	\$78.57

Apprentice - FLOORCOVERER - Local 2168 Zone II

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.74	\$8.83	\$1.76	\$0.00	\$35.33
2	55	\$27.21	\$8.83	\$1.76	\$0.00	\$37.80
3	60	\$29.68	\$8.83	\$3.52	\$0.00	\$42.03
4	65	\$32.16	\$8.83	\$3.52	\$0.00	\$44.51
5	70	\$34.63	\$8.83	\$16.75	\$0.00	\$60.21
6	75	\$37.10	\$8.83	\$16.75	\$0.00	\$62.68
7	80	\$39.58	\$8.83	\$18.51	\$0.00	\$66.92
8	85	\$42.05	\$8.83	\$18.51	\$0.00	\$69.39

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 \$32.63/ 3&4 \$39.28/ 5&6 \$59.86/ 7&8 \$66.52

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER OPERATING ENGINEERS LOCAL 4	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS OPERATING ENGINEERS LOCAL 4	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 35 (ZONE 2)	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$9.95	\$0.00	\$0.00	\$33.33
2	55	\$25.72	\$9.95	\$6.66	\$0.00	\$42.33
3	60	\$28.06	\$9.95	\$7.26	\$0.00	\$45.27
4	65	\$30.39	\$9.95	\$7.87	\$0.00	\$48.21
5	70	\$32.73	\$9.95	\$20.32	\$0.00	\$63.00
6	75	\$35.07	\$9.95	\$20.93	\$0.00	\$65.95
7	80	\$37.41	\$9.95	\$21.53	\$0.00	\$68.89
8	90	\$42.08	\$9.95	\$22.74	\$0.00	\$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.98	\$9.95	\$0.00	\$0.00	\$33.93
2	55	\$26.38	\$9.95	\$6.66	\$0.00	\$42.99
3	60	\$28.78	\$9.95	\$7.26	\$0.00	\$45.99
4	65	\$31.17	\$9.95	\$7.87	\$0.00	\$48.99
5	70	\$33.57	\$9.95	\$20.32	\$0.00	\$63.84
6	75	\$35.97	\$9.95	\$20.93	\$0.00	\$66.85
7	80	\$38.37	\$9.95	\$21.53	\$0.00	\$69.85
8	90	\$43.16	\$9.95	\$22.74	\$0.00	\$75.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.82	\$15.30	\$0.00	\$0.00	\$46.12
2	60	\$33.62	\$15.30	\$16.40	\$0.00	\$65.32
3	65	\$36.42	\$15.30	\$16.40	\$0.00	\$68.12
4	70	\$39.22	\$15.30	\$16.40	\$0.00	\$70.92
5	75	\$42.02	\$15.30	\$16.40	\$0.00	\$73.72
6	80	\$44.82	\$15.30	\$16.40	\$0.00	\$76.52
7	85	\$47.63	\$15.30	\$16.40	\$0.00	\$79.33
8	90	\$50.43	\$15.30	\$16.40	\$0.00	\$82.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$31.61	\$0.00	\$0.00	\$0.00	\$31.61
2	60	\$34.49	\$15.30	\$16.40	\$0.00	\$66.19
3	65	\$37.36	\$15.30	\$16.40	\$0.00	\$69.06
4	70	\$40.24	\$15.30	\$16.40	\$0.00	\$71.94
5	75	\$43.11	\$15.30	\$16.40	\$0.00	\$74.81
6	80	\$45.98	\$15.30	\$16.40	\$0.00	\$77.68
7	85	\$48.86	\$15.30	\$16.40	\$0.00	\$80.56
8	90	\$51.73	\$15.30	\$16.40	\$0.00	\$83.43

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 63	07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
For apprentice rates see "Apprentice- SHEET METAL WORKER"	01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 96	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
For apprentice rates see "Apprentice- ELECTRICIAN"	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 63	07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
For apprentice rates see "Apprentice- SHEET METAL WORKER"	01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30
HVAC (TESTING AND BALANCING -WATER) PLUMBERS LOCAL 4	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	09/01/2024	\$51.23	\$14.75	\$19.61	\$0.00	\$85.59
	09/01/2025	\$54.31	\$14.75	\$19.61	\$0.00	\$88.67
	09/01/2026	\$57.38	\$14.75	\$19.61	\$0.00	\$91.74

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

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.62	\$14.75	\$14.32	\$0.00	\$54.69
2	60	\$30.74	\$14.75	\$15.37	\$0.00	\$60.86
3	70	\$35.86	\$14.75	\$16.43	\$0.00	\$67.04
4	80	\$40.98	\$14.75	\$17.49	\$0.00	\$73.22

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.16	\$14.75	\$14.32	\$0.00	\$56.23
2	60	\$32.59	\$14.75	\$15.37	\$0.00	\$62.71
3	70	\$38.02	\$14.75	\$16.43	\$0.00	\$69.20
4	80	\$43.45	\$14.75	\$17.49	\$0.00	\$75.69

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (WORCESTER AREA)</i>	03/16/2024	\$53.67	\$8.35	\$26.70	\$0.00	\$88.72

Apprentice - IRONWORKER - Local 7 Worcester

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$32.20	\$8.35	\$26.70	\$0.00	\$67.25
2	70	\$37.57	\$8.35	\$26.70	\$0.00	\$72.62
3	75	\$40.25	\$8.35	\$26.70	\$0.00	\$75.30
4	80	\$42.94	\$8.35	\$26.70	\$0.00	\$77.99
5	85	\$45.62	\$8.35	\$26.70	\$0.00	\$80.67
6	90	\$48.30	\$8.35	\$26.70	\$0.00	\$83.35

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46

Apprentice - LABORER - Zone 2

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.12	\$9.65	\$18.40	\$0.00	\$51.17
2	70	\$26.97	\$9.65	\$18.40	\$0.00	\$55.02
3	80	\$30.82	\$9.65	\$18.40	\$0.00	\$58.87
4	90	\$34.68	\$9.65	\$18.40	\$0.00	\$62.73

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$18.40	\$0.00	\$51.97
2	70	\$27.90	\$9.65	\$18.40	\$0.00	\$55.95
3	80	\$31.89	\$9.65	\$18.40	\$0.00	\$59.94
4	90	\$35.87	\$9.65	\$18.40	\$0.00	\$63.92

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY)	06/01/2024	\$38.53	\$9.65	\$17.80	\$0.00	\$65.98
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2024	\$39.86	\$9.65	\$17.80	\$0.00	\$67.31
	06/01/2025	\$41.25	\$9.65	\$17.80	\$0.00	\$68.70
	12/01/2025	\$42.63	\$9.65	\$17.80	\$0.00	\$70.08
	06/01/2026	\$44.07	\$9.65	\$17.80	\$0.00	\$71.52
	12/01/2026	\$45.51	\$9.65	\$17.80	\$0.00	\$72.96

Apprentice - LABORER (Heavy & Highway) - Zone 2

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.12	\$9.65	\$17.80	\$0.00	\$50.57
2	70	\$26.97	\$9.65	\$17.80	\$0.00	\$54.42
3	80	\$30.82	\$9.65	\$17.80	\$0.00	\$58.27
4	90	\$34.68	\$9.65	\$17.80	\$0.00	\$62.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$17.80	\$0.00	\$51.37
2	70	\$27.90	\$9.65	\$17.80	\$0.00	\$55.35
3	80	\$31.89	\$9.65	\$17.80	\$0.00	\$59.34
4	90	\$35.87	\$9.65	\$17.80	\$0.00	\$63.32

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	06/03/2024	\$38.62	\$9.65	\$17.76	\$0.00	\$66.03
	12/02/2024	\$39.95	\$9.65	\$17.76	\$0.00	\$67.36
	06/02/2025	\$41.34	\$9.65	\$17.76	\$0.00	\$68.75
	12/01/2025	\$42.72	\$9.65	\$17.76	\$0.00	\$70.13
	06/01/2026	\$44.16	\$9.65	\$17.76	\$0.00	\$71.57
	12/07/2026	\$45.60	\$9.65	\$17.76	\$0.00	\$73.01
	06/07/2027	\$47.05	\$9.65	\$17.76	\$0.00	\$74.46
	12/06/2027	\$48.50	\$9.65	\$17.76	\$0.00	\$75.91
	06/05/2028	\$50.00	\$9.65	\$17.76	\$0.00	\$77.41
	12/04/2028	\$51.50	\$9.65	\$17.76	\$0.00	\$78.91
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
	For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"					
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
	For apprentice rates see "Apprentice- LABORER"					
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
	This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"					
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
	For apprentice rates see "Apprentice- LABORER"					
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2024	\$49.32	\$11.49	\$21.62	\$0.00	\$82.43
	02/01/2025	\$50.36	\$11.49	\$21.62	\$0.00	\$83.47
	08/01/2025	\$52.08	\$11.49	\$21.62	\$0.00	\$85.19
	02/01/2026	\$53.16	\$11.49	\$21.62	\$0.00	\$86.27
	08/01/2026	\$54.92	\$11.49	\$21.62	\$0.00	\$88.03
	02/01/2027	\$56.04	\$11.49	\$21.62	\$0.00	\$89.15

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.66	\$11.49	\$21.62	\$0.00	\$57.77
2	60	\$29.59	\$11.49	\$21.62	\$0.00	\$62.70
3	70	\$34.52	\$11.49	\$21.62	\$0.00	\$67.63
4	80	\$39.46	\$11.49	\$21.62	\$0.00	\$72.57
5	90	\$44.39	\$11.49	\$21.62	\$0.00	\$77.50

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.18	\$11.49	\$21.62	\$0.00	\$58.29
2	60	\$30.22	\$11.49	\$21.62	\$0.00	\$63.33
3	70	\$35.25	\$11.49	\$21.62	\$0.00	\$68.36
4	80	\$40.29	\$11.49	\$21.62	\$0.00	\$73.40
5	90	\$45.32	\$11.49	\$21.62	\$0.00	\$78.43

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2024	\$64.52	\$11.49	\$23.56	\$0.00	\$99.57
	02/01/2025	\$65.82	\$11.49	\$23.56	\$0.00	\$100.87
	08/01/2025	\$67.97	\$11.49	\$23.56	\$0.00	\$103.02
	02/01/2026	\$69.32	\$11.49	\$23.56	\$0.00	\$104.37
	08/01/2026	\$71.52	\$11.49	\$23.56	\$0.00	\$106.57
	02/01/2027	\$72.92	\$11.49	\$23.56	\$0.00	\$107.97

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

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.26	\$11.49	\$23.56	\$0.00	\$67.31
2	60	\$38.71	\$11.49	\$23.56	\$0.00	\$73.76
3	70	\$45.16	\$11.49	\$23.56	\$0.00	\$80.21
4	80	\$51.62	\$11.49	\$23.56	\$0.00	\$86.67
5	90	\$58.07	\$11.49	\$23.56	\$0.00	\$93.12

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.91	\$11.49	\$23.56	\$0.00	\$67.96
2	60	\$39.49	\$11.49	\$23.56	\$0.00	\$74.54
3	70	\$46.07	\$11.49	\$23.56	\$0.00	\$81.12
4	80	\$52.66	\$11.49	\$23.56	\$0.00	\$87.71
5	90	\$59.24	\$11.49	\$23.56	\$0.00	\$94.29

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 3)	01/01/2024	\$41.20	\$10.08	\$21.22	\$0.00	\$72.50
MILLWRIGHTS LOCAL 1121 - Zone 3	01/06/2025	\$43.48	\$10.08	\$21.22	\$0.00	\$74.78
	01/05/2026	\$45.76	\$10.08	\$21.22	\$0.00	\$77.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - MILLWRIGHT - Local 1121 Zone 3

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$22.66	\$10.08	\$5.36	\$0.00	\$38.10
2	65	\$26.78	\$10.08	\$6.34	\$0.00	\$43.20
3	75	\$30.90	\$10.08	\$18.78	\$0.00	\$59.76
4	85	\$35.02	\$10.08	\$19.76	\$0.00	\$64.86

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.91	\$10.08	\$5.36	\$0.00	\$39.35
2	65	\$28.26	\$10.08	\$6.34	\$0.00	\$44.68
3	75	\$32.61	\$10.08	\$18.78	\$0.00	\$61.47
4	85	\$36.96	\$10.08	\$19.76	\$0.00	\$66.80

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

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
LABORERS - ZONE 2	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS)	06/01/2024	\$24.71	\$15.30	\$16.40	\$0.00	\$56.41
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$25.37	\$15.30	\$16.40	\$0.00	\$57.07
	06/01/2025	\$25.97	\$15.30	\$16.40	\$0.00	\$57.67
	12/01/2025	\$26.63	\$15.30	\$16.40	\$0.00	\$58.33
	06/01/2026	\$27.22	\$15.30	\$16.40	\$0.00	\$58.92
	12/01/2026	\$27.89	\$15.30	\$16.40	\$0.00	\$59.59

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS)	06/01/2024	\$30.28	\$15.30	\$16.40	\$0.00	\$61.98
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$31.08	\$15.30	\$16.40	\$0.00	\$62.78
	06/01/2025	\$31.80	\$15.30	\$16.40	\$0.00	\$63.50
	12/01/2025	\$32.60	\$15.30	\$16.40	\$0.00	\$64.30
	06/01/2026	\$33.32	\$15.30	\$16.40	\$0.00	\$65.02
	12/01/2026	\$34.12	\$15.30	\$16.40	\$0.00	\$65.82

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.23	\$9.95	\$0.00	\$0.00	\$39.18
2	55	\$32.15	\$9.95	\$6.66	\$0.00	\$48.76
3	60	\$35.08	\$9.95	\$7.26	\$0.00	\$52.29
4	65	\$38.00	\$9.95	\$7.87	\$0.00	\$55.82
5	70	\$40.92	\$9.95	\$20.32	\$0.00	\$71.19
6	75	\$43.85	\$9.95	\$20.93	\$0.00	\$74.73
7	80	\$46.77	\$9.95	\$21.53	\$0.00	\$78.25
8	90	\$52.61	\$9.95	\$22.74	\$0.00	\$85.30

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2024	\$48.16	\$9.95	\$23.95	\$0.00	\$82.06
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2025	\$49.36	\$9.95	\$23.95	\$0.00	\$83.26

Classification			Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New								
Effective Date -			07/01/2024					
Step	percent	Apprentice Base Wage		Health	Pension	Supplemental Unemployment		Total Rate
1	50	\$24.08		\$9.95	\$0.00	\$0.00		\$34.03
2	55	\$26.49		\$9.95	\$6.66	\$0.00		\$43.10
3	60	\$28.90		\$9.95	\$7.26	\$0.00		\$46.11
4	65	\$31.30		\$9.95	\$7.87	\$0.00		\$49.12
5	70	\$33.71		\$9.95	\$20.32	\$0.00		\$63.98
6	75	\$36.12		\$9.95	\$20.93	\$0.00		\$67.00
7	80	\$38.53		\$9.95	\$21.53	\$0.00		\$70.01
8	90	\$43.34		\$9.95	\$22.74	\$0.00		\$76.03
Effective Date -			01/01/2025					
Step	percent	Apprentice Base Wage		Health	Pension	Supplemental Unemployment		Total Rate
1	50	\$24.68		\$9.95	\$0.00	\$0.00		\$34.63
2	55	\$27.15		\$9.95	\$6.66	\$0.00		\$43.76
3	60	\$29.62		\$9.95	\$7.26	\$0.00		\$46.83
4	65	\$32.08		\$9.95	\$7.87	\$0.00		\$49.90
5	70	\$34.55		\$9.95	\$20.32	\$0.00		\$64.82
6	75	\$37.02		\$9.95	\$20.93	\$0.00		\$67.90
7	80	\$39.49		\$9.95	\$21.53	\$0.00		\$70.97
8	90	\$44.42		\$9.95	\$22.74	\$0.00		\$77.11
Notes:								
Steps are 750 hrs.								
Apprentice to Journeyworker Ratio:1:1								
PAINTER (SPRAY OR SANDBLAST, REPAINT)			07/01/2024	\$46.22	\$9.95	\$23.95	\$0.00	\$80.12
PAINTERS LOCAL 35 - ZONE 2			01/01/2025	\$47.42	\$9.95	\$23.95	\$0.00	\$81.32

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$9.95	\$0.00	\$0.00	\$33.06
2	55	\$25.42	\$9.95	\$6.66	\$0.00	\$42.03
3	60	\$27.73	\$9.95	\$7.26	\$0.00	\$44.94
4	65	\$30.04	\$9.95	\$7.87	\$0.00	\$47.86
5	70	\$32.35	\$9.95	\$20.32	\$0.00	\$62.62
6	75	\$34.67	\$9.95	\$20.93	\$0.00	\$65.55
7	80	\$36.98	\$9.95	\$21.53	\$0.00	\$68.46
8	90	\$41.60	\$9.95	\$22.74	\$0.00	\$74.29

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.71	\$9.95	\$0.00	\$0.00	\$33.66
2	55	\$26.08	\$9.95	\$6.66	\$0.00	\$42.69
3	60	\$28.45	\$9.95	\$7.26	\$0.00	\$45.66
4	65	\$30.82	\$9.95	\$7.87	\$0.00	\$48.64
5	70	\$33.19	\$9.95	\$20.32	\$0.00	\$63.46
6	75	\$35.57	\$9.95	\$20.93	\$0.00	\$66.45
7	80	\$37.94	\$9.95	\$21.53	\$0.00	\$69.42
8	90	\$42.68	\$9.95	\$22.74	\$0.00	\$75.37

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$9.95	\$0.00	\$0.00	\$33.33
2	55	\$25.72	\$9.95	\$6.66	\$0.00	\$42.33
3	60	\$28.06	\$9.95	\$7.26	\$0.00	\$45.27
4	65	\$30.39	\$9.95	\$7.87	\$0.00	\$48.21
5	70	\$32.73	\$9.95	\$20.32	\$0.00	\$63.00
6	75	\$35.07	\$9.95	\$20.93	\$0.00	\$65.95
7	80	\$37.41	\$9.95	\$21.53	\$0.00	\$68.89
8	90	\$42.08	\$9.95	\$22.74	\$0.00	\$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.98	\$9.95	\$0.00	\$0.00	\$33.93
2	55	\$26.38	\$9.95	\$6.66	\$0.00	\$42.99
3	60	\$28.78	\$9.95	\$7.26	\$0.00	\$45.99
4	65	\$31.17	\$9.95	\$7.87	\$0.00	\$48.99
5	70	\$33.57	\$9.95	\$20.32	\$0.00	\$63.84
6	75	\$35.97	\$9.95	\$20.93	\$0.00	\$66.85
7	80	\$38.37	\$9.95	\$21.53	\$0.00	\$69.85
8	90	\$43.16	\$9.95	\$22.74	\$0.00	\$75.85

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	07/01/2024	\$44.82	\$9.95	\$23.95	\$0.00	\$78.72
PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$46.02	\$9.95	\$23.95	\$0.00	\$79.92

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.41	\$9.95	\$0.00	\$0.00	\$32.36
2	55	\$24.65	\$9.95	\$6.66	\$0.00	\$41.26
3	60	\$26.89	\$9.95	\$7.26	\$0.00	\$44.10
4	65	\$29.13	\$9.95	\$7.87	\$0.00	\$46.95
5	70	\$31.37	\$9.95	\$20.32	\$0.00	\$61.64
6	75	\$33.62	\$9.95	\$20.93	\$0.00	\$64.50
7	80	\$35.86	\$9.95	\$21.53	\$0.00	\$67.34
8	90	\$40.34	\$9.95	\$22.74	\$0.00	\$73.03

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.01	\$9.95	\$0.00	\$0.00	\$32.96
2	55	\$25.31	\$9.95	\$6.66	\$0.00	\$41.92
3	60	\$27.61	\$9.95	\$7.26	\$0.00	\$44.82
4	65	\$29.91	\$9.95	\$7.87	\$0.00	\$47.73
5	70	\$32.21	\$9.95	\$20.32	\$0.00	\$62.48
6	75	\$34.52	\$9.95	\$20.93	\$0.00	\$65.40
7	80	\$36.82	\$9.95	\$21.53	\$0.00	\$68.30
8	90	\$41.42	\$9.95	\$22.74	\$0.00	\$74.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	06/01/2024	\$38.53	\$9.65	\$17.80	\$0.00	\$65.98
	12/01/2024	\$39.86	\$9.65	\$17.80	\$0.00	\$67.31
	06/01/2025	\$41.25	\$9.65	\$17.80	\$0.00	\$68.70
	12/01/2025	\$42.63	\$9.65	\$17.80	\$0.00	\$70.08
	06/01/2026	\$44.07	\$9.65	\$17.80	\$0.00	\$71.52
	12/01/2026	\$45.51	\$9.65	\$17.80	\$0.00	\$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	06/01/2024	\$39.78	\$15.07	\$18.67	\$0.00	\$73.52
	12/01/2024	\$39.78	\$15.07	\$20.17	\$0.00	\$75.02
	01/01/2025	\$39.78	\$15.57	\$20.17	\$0.00	\$75.52
	06/01/2025	\$40.78	\$15.57	\$20.17	\$0.00	\$76.52
	12/01/2025	\$40.78	\$15.57	\$21.78	\$0.00	\$78.13
	01/01/2026	\$40.78	\$16.17	\$21.78	\$0.00	\$78.73
	06/01/2026	\$41.78	\$16.17	\$21.78	\$0.00	\$79.73
	12/01/2026	\$41.78	\$16.17	\$23.52	\$0.00	\$81.47
	01/01/2027	\$41.78	\$16.77	\$23.52	\$0.00	\$82.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i> For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63

Apprentice - PILE DRIVER - Local 56 Zone 2

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: Apprentice wages shall be no less than the following Steps;

(Same as set in Zone 1)

1\$57.06/2\$61.96/3\$66.87/4\$69.32/5\$71.78/6\$71.78/7\$76.68/8\$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

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

PLUMBER & PIPEFITTER <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - PLUMBER/PIPEFITTER - Local 4						
Effective Date - 09/01/2024						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.14	\$9.90	\$0.00	\$0.00	\$32.04
2	50	\$27.68	\$9.90	\$0.00	\$0.00	\$37.58
3	60	\$33.21	\$9.90	\$0.00	\$0.00	\$43.11
4	70	\$38.75	\$9.90	\$7.71	\$0.00	\$56.36
5	80	\$44.28	\$9.90	\$7.71	\$0.00	\$61.89
Effective Date - 03/01/2025						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.70	\$9.90	\$0.00	\$0.00	\$32.60
2	50	\$28.38	\$9.90	\$0.00	\$0.00	\$38.28
3	60	\$34.05	\$9.90	\$0.00	\$0.00	\$43.95
4	70	\$39.73	\$9.90	\$7.71	\$0.00	\$57.34
5	80	\$45.40	\$9.90	\$7.71	\$0.00	\$63.01
Notes:						
Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%						
Step 4 w/lic \$52.59, Step 5 w/lic \$57.44						
Apprentice to Journeyworker Ratio:1:3						
PNEUMATIC CONTROLS (TEMP.) PLUMBERS LOCAL 4	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 2	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.53	\$9.65	\$18.40	\$0.00	\$67.58
	12/01/2024	\$40.86	\$9.65	\$18.40	\$0.00	\$68.91
	06/01/2025	\$42.25	\$9.65	\$18.40	\$0.00	\$70.30
	12/01/2025	\$43.63	\$9.65	\$18.40	\$0.00	\$71.68
	06/01/2026	\$45.07	\$9.65	\$18.40	\$0.00	\$73.12
	12/01/2026	\$46.51	\$9.65	\$18.40	\$0.00	\$74.56
	06/01/2027	\$47.96	\$9.65	\$18.40	\$0.00	\$76.01
	12/01/2027	\$49.41	\$9.65	\$18.40	\$0.00	\$77.46
	06/01/2028	\$50.91	\$9.65	\$18.40	\$0.00	\$78.96
	12/01/2028	\$52.41	\$9.65	\$18.40	\$0.00	\$80.46
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.53	\$9.40	\$17.55	\$0.00	\$66.48
	12/01/2024	\$40.86	\$9.40	\$17.55	\$0.00	\$67.81
	06/01/2025	\$42.25	\$9.40	\$17.55	\$0.00	\$69.20
	12/01/2025	\$43.63	\$9.40	\$17.55	\$0.00	\$70.58
	06/01/2026	\$45.07	\$9.40	\$17.55	\$0.00	\$72.02
	12/01/2026	\$46.51	\$9.40	\$17.55	\$0.00	\$73.46
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - Dauphinais (Bellingham)</i>	01/01/2024	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	12/01/2024	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
	01/01/2025	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofing &Roofer Damproofg) <i>ROOFERS LOCAL 33</i>	08/01/2024	\$51.03	\$13.03	\$21.70	\$0.00	\$85.76
	02/01/2025	\$52.28	\$13.03	\$21.70	\$0.00	\$87.01
	08/01/2025	\$53.78	\$13.03	\$21.70	\$0.00	\$88.51
	02/01/2026	\$55.03	\$13.03	\$21.70	\$0.00	\$89.76

Classification			Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - ROOFER - Local 33								
Effective Date -			08/01/2024					
Step	percent	Apprentice Base Wage		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$25.52		\$13.03	\$6.52	\$0.00	\$45.07	
2	60	\$30.62		\$13.03	\$21.70	\$0.00	\$65.35	
3	65	\$33.17		\$13.03	\$21.70	\$0.00	\$67.90	
4	75	\$38.27		\$13.03	\$21.70	\$0.00	\$73.00	
5	85	\$43.38		\$13.03	\$21.70	\$0.00	\$78.11	
Effective Date -			02/01/2025					
Step	percent	Apprentice Base Wage		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$26.14		\$13.03	\$6.52	\$0.00	\$45.69	
2	60	\$31.37		\$13.03	\$21.70	\$0.00	\$66.10	
3	65	\$33.98		\$13.03	\$21.70	\$0.00	\$68.71	
4	75	\$39.21		\$13.03	\$21.70	\$0.00	\$73.94	
5	85	\$44.44		\$13.03	\$21.70	\$0.00	\$79.17	
Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs. (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)								
Apprentice to Journeyworker Ratio:**								
ROOFER SLATE / TILE / PRECAST CONCRETE			08/01/2024	\$51.28	\$13.03	\$21.70	\$0.00	\$86.01
ROOFERS LOCAL 33			02/01/2025	\$52.53	\$13.03	\$21.70	\$0.00	\$87.26
			08/01/2025	\$54.03	\$13.03	\$21.70	\$0.00	\$88.76
			02/01/2026	\$55.28	\$13.03	\$21.70	\$0.00	\$90.01
For apprentice rates see "Apprentice- ROOFER"								
SHEETMETAL WORKER			07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
SHEETMETAL WORKERS LOCAL 63			01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30

Apprentice - SHEET METAL WORKER - Local 63

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.44	\$5.49	\$4.86	\$0.85	\$29.64
2	50	\$20.49	\$6.10	\$5.40	\$0.94	\$32.93
3	55	\$22.54	\$6.71	\$9.71	\$1.15	\$40.11
4	60	\$24.59	\$7.32	\$9.71	\$1.23	\$42.85
5	65	\$26.64	\$7.93	\$9.71	\$1.31	\$45.59
6	70	\$28.69	\$8.54	\$9.71	\$1.39	\$48.33
7	75	\$30.74	\$9.15	\$9.71	\$1.47	\$51.07
8	80	\$32.78	\$9.76	\$17.66	\$1.78	\$61.98
9	85	\$34.83	\$10.37	\$17.66	\$1.86	\$64.72
10	90	\$36.88	\$10.98	\$17.66	\$1.94	\$67.46

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$19.00	\$5.49	\$4.86	\$0.85	\$30.20
2	50	\$21.12	\$6.10	\$5.40	\$0.94	\$33.56
3	55	\$23.23	\$6.71	\$9.71	\$1.15	\$40.80
4	60	\$25.34	\$7.32	\$9.71	\$1.23	\$43.60
5	65	\$27.45	\$7.93	\$9.71	\$1.31	\$46.40
6	70	\$29.56	\$8.54	\$9.71	\$1.39	\$49.20
7	75	\$31.67	\$9.15	\$9.71	\$1.47	\$52.00
8	80	\$33.78	\$9.76	\$17.66	\$1.78	\$62.98
9	85	\$35.90	\$10.37	\$17.66	\$1.86	\$65.79
10	90	\$38.01	\$10.98	\$17.66	\$1.94	\$68.59

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.53	\$15.07	\$18.67	\$0.00	\$74.27
	12/01/2024	\$40.53	\$15.07	\$20.17	\$0.00	\$75.77
	01/01/2025	\$40.53	\$15.57	\$20.17	\$0.00	\$76.27
	06/01/2025	\$41.53	\$15.57	\$20.17	\$0.00	\$77.27
	12/01/2025	\$41.53	\$15.57	\$21.78	\$0.00	\$78.88
	01/01/2026	\$41.53	\$16.17	\$21.78	\$0.00	\$79.48
	06/01/2026	\$42.53	\$16.17	\$21.78	\$0.00	\$80.48
	12/01/2026	\$42.53	\$16.17	\$23.52	\$0.00	\$82.22
	01/01/2027	\$42.53	\$16.77	\$23.52	\$0.00	\$82.82
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 669</i>	04/01/2023	\$47.43	\$11.45	\$16.61	\$0.00	\$75.49

Apprentice - SPRINKLER FITTER - Local 669

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.34	\$8.22	\$0.00	\$0.00	\$29.56
2	50	\$23.72	\$8.22	\$0.00	\$0.00	\$31.94
3	55	\$26.09	\$11.45	\$7.20	\$0.00	\$44.74
4	60	\$28.46	\$11.45	\$8.35	\$0.00	\$48.26
5	65	\$30.83	\$11.45	\$8.35	\$0.00	\$50.63
6	70	\$33.20	\$11.45	\$8.60	\$0.00	\$53.25
7	75	\$35.57	\$11.45	\$8.60	\$0.00	\$55.62
8	80	\$37.94	\$11.45	\$8.60	\$0.00	\$57.99
9	85	\$40.32	\$11.45	\$8.60	\$0.00	\$60.37
10	90	\$42.69	\$11.45	\$8.60	\$0.00	\$62.74

Notes:

Apprentice to Journeyworker Ratio:1:1

STEAM BOILER OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2024	\$63.44	\$11.49	\$23.59	\$0.00	\$98.52
	02/01/2025	\$64.74	\$11.49	\$23.59	\$0.00	\$99.82
	08/01/2025	\$66.89	\$11.49	\$23.59	\$0.00	\$101.97
	02/01/2026	\$68.24	\$11.49	\$23.59	\$0.00	\$103.32
	08/01/2026	\$70.44	\$11.49	\$23.59	\$0.00	\$105.52
	02/01/2027	\$71.84	\$11.49	\$23.59	\$0.00	\$106.92

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.72	\$11.49	\$23.59	\$0.00	\$66.80
2	60	\$38.06	\$11.49	\$23.59	\$0.00	\$73.14
3	70	\$44.41	\$11.49	\$23.59	\$0.00	\$79.49
4	80	\$50.75	\$11.49	\$23.59	\$0.00	\$85.83
5	90	\$57.10	\$11.49	\$23.59	\$0.00	\$92.18

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.37	\$11.49	\$23.59	\$0.00	\$67.45
2	60	\$38.84	\$11.49	\$23.59	\$0.00	\$73.92
3	70	\$45.32	\$11.49	\$23.59	\$0.00	\$80.40
4	80	\$51.79	\$11.49	\$23.59	\$0.00	\$86.87
5	90	\$58.27	\$11.49	\$23.59	\$0.00	\$93.35

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$49.81	\$9.65	\$18.22	\$0.00	\$77.68
	12/01/2024	\$51.28	\$9.65	\$18.22	\$0.00	\$79.15
	06/01/2025	\$52.78	\$9.65	\$18.22	\$0.00	\$80.65
	12/01/2025	\$54.28	\$9.65	\$18.22	\$0.00	\$82.15
	06/01/2026	\$55.83	\$9.65	\$18.22	\$0.00	\$83.70
	12/01/2026	\$57.33	\$9.65	\$18.22	\$0.00	\$85.20

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.60	\$9.65	\$18.22	\$0.00	\$73.47
	12/01/2024	\$47.07	\$9.65	\$18.22	\$0.00	\$74.94
	06/01/2025	\$48.57	\$9.65	\$18.22	\$0.00	\$76.44
	12/01/2025	\$50.07	\$9.65	\$18.22	\$0.00	\$77.94
	06/01/2026	\$51.62	\$9.65	\$18.22	\$0.00	\$79.49
	12/01/2026	\$53.12	\$9.65	\$18.22	\$0.00	\$80.99

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.48	\$9.65	\$18.22	\$0.00	\$73.35
	12/01/2024	\$46.95	\$9.65	\$18.22	\$0.00	\$74.82
	06/01/2025	\$48.45	\$9.65	\$18.22	\$0.00	\$76.32
	12/01/2025	\$49.95	\$9.65	\$18.22	\$0.00	\$77.82
	06/01/2026	\$51.50	\$9.65	\$18.22	\$0.00	\$79.37
	12/01/2026	\$53.00	\$9.65	\$18.22	\$0.00	\$80.87
	For apprentice rates see "Apprentice- LABORER"					
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
	For apprentice rates see "Apprentice- OPERATING ENGINEERS"					
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.82	\$15.07	\$18.67	\$0.00	\$74.56
	12/01/2024	\$40.82	\$15.07	\$20.17	\$0.00	\$76.06
	01/01/2025	\$40.82	\$15.57	\$20.17	\$0.00	\$76.56
	06/01/2025	\$41.82	\$15.57	\$20.17	\$0.00	\$77.56
	12/01/2025	\$41.82	\$15.57	\$21.78	\$0.00	\$79.17
	01/01/2026	\$41.82	\$16.17	\$21.78	\$0.00	\$79.77
	06/01/2026	\$42.82	\$16.17	\$21.78	\$0.00	\$80.77
	12/01/2026	\$42.82	\$16.17	\$23.52	\$0.00	\$82.51
	01/01/2027	\$42.82	\$16.77	\$23.52	\$0.00	\$83.11
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	06/01/2024	\$57.71	\$9.65	\$19.00	\$0.00	\$86.36
	12/01/2024	\$59.18	\$9.65	\$19.00	\$0.00	\$87.83
	06/01/2025	\$60.68	\$9.65	\$19.00	\$0.00	\$89.33
	12/01/2025	\$62.18	\$9.65	\$19.00	\$0.00	\$90.83
	06/01/2026	\$63.73	\$9.65	\$19.00	\$0.00	\$92.38
	12/01/2026	\$65.23	\$9.65	\$19.00	\$0.00	\$93.88
	For apprentice rates see "Apprentice- LABORER"					
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	06/01/2024	\$59.71	\$9.65	\$19.00	\$0.00	\$88.36
	12/01/2024	\$61.18	\$9.65	\$19.00	\$0.00	\$89.83
	06/01/2025	\$62.68	\$9.65	\$19.00	\$0.00	\$91.33
	12/01/2025	\$64.18	\$9.65	\$19.00	\$0.00	\$92.83
	06/01/2026	\$65.73	\$9.65	\$19.00	\$0.00	\$94.38
	12/01/2026	\$67.23	\$9.65	\$19.00	\$0.00	\$95.88
	For apprentice rates see "Apprentice- LABORER"					
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2024	\$49.78	\$9.65	\$19.00	\$0.00	\$78.43
	12/01/2024	\$51.25	\$9.65	\$19.00	\$0.00	\$79.90
	06/01/2025	\$52.75	\$9.65	\$19.00	\$0.00	\$81.40
	12/01/2025	\$54.25	\$9.65	\$19.00	\$0.00	\$82.90
	06/01/2026	\$55.80	\$9.65	\$19.00	\$0.00	\$84.45
	12/01/2026	\$57.30	\$9.65	\$19.00	\$0.00	\$85.95
	For apprentice rates see "Apprentice- LABORER"					

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2024	\$51.78	\$9.65	\$19.00	\$0.00	\$80.43
	12/01/2024	\$53.25	\$9.65	\$19.00	\$0.00	\$81.90
	06/01/2025	\$54.75	\$9.65	\$19.00	\$0.00	\$83.40
	12/01/2025	\$56.25	\$9.65	\$19.00	\$0.00	\$84.90
	06/01/2026	\$57.80	\$9.65	\$19.00	\$0.00	\$86.45
	12/01/2026	\$59.30	\$9.65	\$19.00	\$0.00	\$87.95
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
VOICE-DATA-VIDEO TECHNICIAN <i>ELECTRICIANS LOCAL 96</i>	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53
	09/01/2024	\$35.29	\$13.99	\$17.57	\$0.00	\$66.85
	09/07/2025	\$36.12	\$14.98	\$17.91	\$0.00	\$69.01
	09/06/2026	\$37.04	\$15.96	\$18.27	\$0.00	\$71.27

Apprentice - VOICE-DATA-VIDEO TECHNICIAN - Local 96

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.65	\$13.99	\$4.41	\$0.00	\$36.05
2	55	\$19.41	\$13.99	\$4.46	\$0.00	\$37.86
3	60	\$21.17	\$13.99	\$17.15	\$0.00	\$52.31
4	65	\$22.94	\$13.99	\$17.20	\$0.00	\$54.13
5	70	\$24.70	\$13.99	\$17.25	\$0.00	\$55.94
6	75	\$26.47	\$13.99	\$17.30	\$0.00	\$57.76
7	80	\$28.23	\$13.99	\$17.36	\$0.00	\$59.58
8	85	\$30.00	\$13.99	\$17.41	\$0.00	\$61.40

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.06	\$14.98	\$4.51	\$0.00	\$37.55
2	55	\$19.87	\$14.98	\$4.57	\$0.00	\$39.42
3	60	\$21.67	\$14.98	\$17.48	\$0.00	\$54.13
4	65	\$23.48	\$14.98	\$17.53	\$0.00	\$55.99
5	70	\$25.28	\$14.98	\$17.59	\$0.00	\$57.85
6	75	\$27.09	\$14.98	\$17.64	\$0.00	\$59.71
7	80	\$28.90	\$14.98	\$17.70	\$0.00	\$61.58
8	85	\$30.70	\$14.98	\$17.75	\$0.00	\$63.43

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
LABORERS - ZONE 2	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21

For apprentice rates see "Apprentice- LABORER"

WAGON DRILL OPERATOR (HEAVY & HIGHWAY)	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.35	\$9.90	\$17.42	\$0.00	\$82.67
	03/01/2025	\$56.75	\$9.90	\$17.42	\$0.00	\$84.07
	09/01/2025	\$58.15	\$9.90	\$17.42	\$0.00	\$85.47
	03/01/2026	\$59.55	\$9.90	\$17.42	\$0.00	\$86.87
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentice Information:

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

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

All steps are six months (1000 hours.)

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

** Multiple ratios are listed in the comment field.

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

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

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

WEEKLY PAYROLL REPORT FORM

Company Name: Prime Contractor

Project Name: Subcontractor

Awarding Auth.: List Prime Contractor:

Work Week Ending: Employer Signature:

Print Name & Title:

Employee Name & Address	Work Classification	Hours Worked							(A)	(B)	Employer Contributions			(F)	(G)
									Tot. Hrs.	Hourly Base Wage	(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.	[B+C+D+E] Hourly Total Wage (prev. wage)	[A*F] Weekly Total Amount
		S	M	T	W	T	F	S							

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. This is required to be done on a weekly basis. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor or public body shall furnish to the Department of Labor & Workforce Development/Division of Occupational Safety within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 20 ____

I, _____, _____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the _____ General Laws.

Signature _____

Title _____

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

EXCERPTS FROM APPLICABLE STATE LAW

Statutory and Executive Order References

The following list of references to Massachusetts General Laws and Executive Orders is provided for the Contractor's reference only. This list is not intended to be exclusive. The fact that there are Massachusetts General Laws and/or Executive Orders that are applicable, but not included herein, shall not be construed to allow the Contractor to avoid their application.

<u>Subject</u>	<u>Statutory/Executive Order Reference</u>	<u>Page</u>
Direct Payment	M.G.L. c. 30, § 39F	1
Deviations	M.G.L. c. 30, § 39I	4
Finality of Awarding Authority's or Architect's Decisions	M.G.L. c. 30, § 39J	5
Public construction, etc., contracts; payments	M.G.L. c. 30, § 39K	5
Substitution of Equipment or Materials	M.G.L. c. 30, § 39M	7
Differing Site Conditions	M.G.L. c. 30, § 39N	7
Delay	M.G.L. c. 30, § 39O	8
Timely Decisions	M.G.L. c. 30, § 39P	8
Contractor's Accounting Methods	M.G.L. c. 30, § 39R	9
Certificate of Appropriation	M.G.L. c. 44, § 31C	12
Sales Tax Exemptions	M.G.L. c. 64, § 6	12
Lodging, Board and Trade of Employees on Public Works Projects	M.G.L. c. 149, § 25	13
Preference to Veterans and Citizens	M.G.L. c. 149, § 26	13
List of Jobs; classification; schedule of wages; penalty; civil action	M.G.L. c. 149, § 27	14
Records of employees; payroll records; statements of compliance	M.G.L. c. 14; § 27B	16
Wages of operators of rented equipment; agreements; penalty; civil action	M.G.L. c. 149, § 27F	17
Contracts for public works; workmen's compensation insurance; breach of contract; enforcement and violation of statute	M.G.L. c. 149, § 34A	17
Reserve Police Officer	M.G.L. c. 149, § 34B	18
Eight-Hour Days	M.G.L. c. 149, § 34	18
Weather Protection	M.G.L. c. 149, § 44G	19
Form of Subcontract	M.G.L. c. 149, § 44F(4)(c)	19
Shoring of Trenches	M.G.L. c. 149, § 129A	22
Foreign Corporations	M.G.L. c. 149, § 129A	22
Certification of Compliance with Tax Laws	M.G.L. c. 62C, § 49A	22
Equal Employment Opportunity and Affirmative Action/Minority Business Enterprise Policy	M.G.L. c. 151B; M.G.L. c. 7, § 40N; Executive Orders Nos. 74, 116, 237, 246 and 390	23

M.G.L. c. 30, c. 39: Direct Payment

(1) Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of [section twenty-nine of chapter one hundred forty-nine](#) shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections [forty-four A](#) to [forty-four H](#), inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of [section thirty-nine M of chapter thirty](#) shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in [forty-four A](#) to [forty-four H](#), inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion

[fifty-nine](#) and [fifty-nine B](#) of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections [fifty-nine](#) and [fifty-nine B](#) and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

M.G.L. c. 30, § 39I: Deviations

Every contractor having a contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or public works for the commonwealth, or of any political subdivision thereof, shall perform all the work required by such contract in conformity with the plans and specifications contained therein. No willful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the engineer or architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such engineer or architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the contracting agency and the contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the contracting authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section willfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both.

M.G.L. c. 30, § 39J: Finality of Awarding Authority's or Architect's Decisions

Notwithstanding any contrary provision of any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount of the contract is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, a decision, by the contracting body or by any administrative board, official

or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily is unsupported by substantial evidence, or is based upon error of law.

M.G.L. c. 30, § 39K: Public construction, etc., contracts; payments.

Every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, shall contain the following paragraph:-- Within fifteen days (forty-five days in the case of the commonwealth, including local housing authorities) after receipt from the contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority will make a periodic payment to the contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, less (1) a retention based on its estimate of the fair value of its claims against the contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of [section thirty-nine F](#), and less (3) a retention not exceeding five per cent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one per cent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of [section thirty-nine F](#), or based on the record of payments by the contractor to the subcontractors under this contract if such record of payment indicates that the contractor has not paid subcontractors as provided in [section thirty-nine F](#). If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen days (twenty-four days in the case of the commonwealth) after receipt of such a periodic estimate from the contractor, at the place designated by the awarding authority if such a place is so designated. The contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the contractor for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of [section thirty-nine G](#) shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of

the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall, subject to the provisions of [section thirty-nine J](#), be conclusive for the purposes of this section.

M.G.L. c. 30, § 39M: Substitution of Equipment or Materials

(b) Specifications for such contracts, and specifications for contracts awarded pursuant to the provisions of said sections [forty-four A](#) to [forty-four L](#) of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefor, in either instance such writing to be prepared after reasonable investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said named or described materials.

M.G.L. c. 30, § 39N: Differing Site Conditions

Every contract subject to [section forty-four A of chapter one hundred and forty-nine](#) or subject to [section thirty-nine M of chapter thirty](#) shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

M.G.L. c. 30 § 39O: Delay

Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

M.G.L. c. 30, § 39P: Timely Decisions

Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.

M.G.L. c. 30, § 39R: Contractor's Accounting Methods

(a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections [thirty-eight A½](#) to [thirty-eight O](#), inclusive, of chapter seven and any contract awarded or executed pursuant to [section eleven C of chapter twenty-five A](#), [section thirty-nine M of chapter thirty](#), or sections [forty-four A](#) to [forty-four H](#), inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) "Contract" means any contract awarded or executed pursuant to sections [thirty-eight A½](#) to [thirty-eight O](#), inclusive, of chapter seven and any contract awarded or executed pursuant to [section eleven C of chapter twenty-five A](#), [section thirty-nine M of chapter thirty](#), or sections [forty-four A](#) through [forty-four H](#), inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

(3) "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

(4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a *certified* opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

(7) "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections [thirty-eight A½](#) to [thirty-eight O](#), inclusive, of chapter seven, or [eleven C of chapter twenty-five A](#), and pursuant to [section thirty-nine M of chapter thirty](#) or to [section forty-four A](#) through [H](#), inclusive, of chapter one hundred and forty-nine, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) until the expiration of six years after final payment, the office of inspector general, and the deputy commissioner of capital planning and operations shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital planning and operations during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the commissioner for capital planning and operations and any other awarding authority shall enforce the provisions of this section. The commissioner of capital planning and operations may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of [chapter thirty A](#) such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to [section forty-four C of chapter one hundred and forty-nine](#).

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in [section seven of chapter four](#) and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

M.G.L. c. 44, § 31C: Certificate of Appropriation

No contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public work by any city or town costing more than two thousand dollars shall be deemed to have been made until the auditor or accountant or other officer of the city or town having similar duties has certified thereon that an appropriation in the amount of such contract is available therefor and that an officer or agent of the city, town or awarding authority has been authorized to execute said contract and approve all requisitions and change orders. No order to the contractor for a change in or addition to the work to be performed under a contract subject to this section, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the contractor is willing to perform without any increase in the contract price, shall be deemed to have been given until the auditor or accountant, or other officer of the city or town having similar duties, has certified thereon that an appropriation in the amount of such order is available therefor; but such certificate shall not be construed as an admission by the city or town of its liability to pay for such work. The certificate of the auditor or accountant or other officer of the city or town having similar duties, that an appropriation in the amount of such contract or order is available shall bar any defense by the city or town on the grounds of insufficient appropriation; and any law barring payment in excess of appropriations shall not apply to amounts covered by any certificate under this section. *(Amended by 1989, 341, Sec. 27 eff. 8-15-89.)*

M.G.L. c. 64H, § 6: Sales Tax Exemption

The following sales and the gross receipts therefrom shall be exempt from the tax imposed by this chapter:

(f) Sales of building materials and supplies to be used in the construction, reconstruction, alteration, remodeling or repair of (1) any building structure, public highway, bridge or other public works owned by or held in trust for the benefit of any governmental body or agency mentioned in paragraph (d) and used exclusively for public purposes and (2) any building or structure owned by or held in trust for the benefit of any corporation, foundation, organization or institution described in paragraph (e) and used exclusively in the conduct of its religious, scientific, charitable or educational purposes; provided, however, that such governmental body or agency or such corporation, foundation, organization or institution shall have first obtained a certificate from the commissioner stating that it is entitled to such exemption and the vendor keeps a record of the sales price of each such separate sale, the name of the purchaser, the date of each such separate sale and the number of such certificate. In this paragraph the words "building materials and supplies" shall include all materials and supplies consumed, employed or expended in the construction, reconstruction, alteration, remodeling or repair of any building, structure, public highway, bridge or other such public work, as well as such materials and supplies physically incorporated therein. Said terms shall also include rental charges for construction vehicles, equipment and machinery rented specifically for use on the site of any such tax exempt project or while being used exclusively for the transportation of materials for any such tax exempt project.

M.G.L. c. 149, § 25: Lodging, Board and Trade of Employees on Public Works Projects

Every employee in public work shall lodge, board and trade where and with whom he elects; and no person or his agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefor, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment.

M.G.L. c. 149, § 26: Preference to Veterans and Citizens

In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a county, town or district, or by persons contracting or subcontracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are male veterans as defined in clause Forty-third of section seven of chapter four, and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect. Each county, town or district in the construction of public works, or persons contracting or subcontracting for such works, shall give preference to veterans and citizens who are residents of such county, town or district. The rate per hour of the wages paid to said mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the commissioner as hereinafter provided; provided, that the wages paid to laborers employed on said works shall not be less than those paid to laborers in the municipal service of the town or towns where said works are being constructed; provided, further, that where the same public work is to be constructed in two or more towns, the wages paid to laborers shall not be less than those paid to laborers in the municipal service of the town paying the highest rate; provided, further, that if, in any of the towns where the works are to be constructed, a wage rate or wage rates have been established in certain trades and occupations by collective agreements or understandings in the private construction industry between organized labor and employers, the rate or rates to be paid on said works shall not be less than the rates so established; provided further, that in towns where no such rate or rates have been so established, the wages paid to mechanics, teamsters, chauffeurs and laborers on public works, shall not be less than the wages paid to the employees in the same trades and occupations by private employers engaged in the construction industry. This section shall also apply to regular employees of the commonwealth or of a county, town or district, when such employees are employed in the construction, addition to or alteration of public buildings for which special appropriations of more than one thousand dollars are provided. Payments by employers to health and

welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided.

Permanent and temporary laborers employed by the state department of highways and by the metropolitan district commission shall receive such salary or compensation as may be fixed under and in accordance with sections forty-five to fifty inclusive of chapter thirty.

M.G.L. c. 149, § 27: List of jobs; classification; schedule of wages; penalty; civil action.

The commissioner shall prepare, for the use of such public officials or public bodies whose duty it shall be to cause public works to be constructed, a list of the several jobs usually performed on various types of public works upon which mechanics and apprentices, teamsters, chauffeurs and laborers are employed, including the transportation of gravel or fill to the site of said public works or the removal of surplus gravel or fill from such site. The commissioner shall classify said jobs, and he may revise such classification from time to time, as he may deem advisable. Prior to awarding a contract for the construction of public works, said public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices, teamsters, chauffeurs and laborers are to be employed, and shall request the commissioner to determine the rate of wages to be paid on each job. Said rates shall apply to all persons engaged in transporting gravel or fill to the site of said public works or removing gravel or fill from such site, regardless of whether such persons are employed by a contractor or subcontractor or are independent contractors or owner-operators. The commissioner, subject to the provisions of section twenty-six, shall proceed forthwith to determine the same, and shall furnish said official or public body with a schedule of such rate or rates of wages as soon as said determination shall have been made. In advertising or calling for bids for said works, the awarding official or public body shall incorporate said schedule in the advertisement or call for bids by an appropriate reference thereto, and shall furnish a copy of said schedule, without cost, to any person requesting the same. Said schedule shall be made a part of the contract for said works and shall continue to be the minimum rate or rates of wages for said employees during the life of the contract. Any person engaged in the construction of said works shall cause a legible copy of said schedule to be kept posted in a conspicuous place at the site of said works during the life of the contract. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in said section twenty-six, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction. Whoever shall pay less than said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, and whoever, for himself, or as representative, agent or officer of another, shall take or receive for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, shall be punished by a fine of not more than ten thousand dollars.

Offers of restitution or payment of restitution shall not be considered in imposing such punishment.

When an investigation by the attorney general's office reveals that a contractor or subcontractor has violated this section by failing to pay said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, or that a contractor or subcontractor has, for himself, or as representative, agent or officer of another, taken or received for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, the attorney general may, upon written notice to the contractor or subcontractor and the sureties of the contractor or subcontractor, and after a hearing thereon, order work halted on the part of the contract on which such wage violations occurred, until the defaulting contractor or subcontractor has filed with the attorney general's office a

bond in the amount of such penal sum as the attorney general shall determine, conditioned upon payment of said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner.

Any employee claiming to be aggrieved by a violation of this section may, at the expiration of ninety days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within three years of such violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief and any damages incurred, including treble damages for any loss of wages and other benefits. Any employee so aggrieved and who prevails in such an action shall be entitled to an award of the costs of the litigation and reasonable attorneys' fees.

M.G.L. c. 149, § 27B: Records of employees; payroll records; statements of compliance.

Every contractor, subcontractor or public body engaged in said public works to which sections [twenty-seven](#) and [twenty-seven A](#) apply shall keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on said works, and the hours worked by, and the wages paid to, each such employee, and shall furnish to the commissioner, upon his request, a copy of said record, signed by the employer or his authorized agent under the penalties of perjury. Such records shall be open to inspection by any authorized representative of the department at any reasonable time, and as often as may be necessary. Every contractor and subcontractor required to keep such a record shall submit a copy of said record to the awarding authority on a weekly basis.

Each such contractor, subcontractor or public body shall preserve its payroll records for a period of three years from the date of completion of the contract.

Each such contractor, subcontractor or public body shall furnish to the commissioner of labor and industries within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body or by any authorized officer or employee of the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

I, _____, 19____

(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

_____ on the _____

(Contractor/Subcontractor/Public Body) (Building or Project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid on accordance with wages determined under the provisions of section twenty-six and twenty-seven of chapter on hundred and forty-nine of the General Laws.

Signature _____

Title _____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the commissioner for such inspection.

M.G.L. c. 149, § 27F: Wages of operators of rented equipment; agreements; penalty; civil action.

No agreement of lease, rental or other arrangement, and no order or requisition under which a truck or any automotive or other vehicle or equipment is to be engaged in public works by the commonwealth or by a county, city, town or district, shall be entered into or given by any public official or public body unless said agreement, order or requisition contains a stipulation requiring prescribed rates of wages, as determined by the commissioner, to be paid to the operators of said trucks, vehicles or equipment. Any such agreement, order or requisition which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of said commissioner by said public official or public body, and shall be furnished by the commissioner in a schedule containing the classifications of jobs, and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said operators.

Whoever pays less than said rates of wages, including payments to health and welfare funds, or the equivalent in wages, on said works, and whoever accepts for his own use, or for the use of any other person, as a rebate, gratuity or in any other guise, any part or portion of said wages or health and welfare funds, shall be punished by a fine of not less than one thousand nor more than five thousand dollars.

Any employee claiming to be aggrieved by a violation of this section may, at the expiration of ninety days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within three years of such violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief and any damages incurred, including treble damages for any loss of wages and other benefits. Any employee so aggrieved and who prevails in such an action shall be entitled to an award of the costs of the litigation and reasonable attorneys' fees.

M.G.L. c. 149, § 34A: Contracts for public works; workmen's compensation insurance; breach of contract; enforcement and violation of statute.

Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall, before commencing performance of such contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and that the contractor shall continue such insurance in full force and effect during the term of the contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a contract until he has been furnished with sufficient proof of compliance with the aforesaid stipulations. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be a sufficient notice. An affidavit of any officer, agent or employee of the insurer or of the insured, as the case may be, duly authorized for the purpose, that he has so sent such notice addressed as aforesaid shall be prima facie evidence of the sending thereof as aforesaid. This section shall apply to the legal representative, trustee in bankruptcy, receiver, assignee, trustee and the successor in interest of any such contractor. The superior court shall have jurisdiction in equity to enforce this section.

Whoever violates any provision of this section shall be punished by a fine of not more than one hundred dollars or by imprisonment for six months, or both; and, in addition, any contractor who violates any provision of this section shall be prohibited from contracting, directly or indirectly, with the commonwealth or any political subdivision thereof, for the construction, alteration, demolition, maintenance or repair of, or addition to, any public works or public building for a period of two years from the date of conviction of said violation.

M.G.L. c. 149, § 34B: Reserve Police Officer

Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wage paid to regular police officers in such city or town.

M.G.L. c. 149, §34: Eight Hour Days

Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, sub-contractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid; provided, that in contracts entered into by the department of highways for the construction or reconstruction of highways there may be inserted in said stipulation a provision that said department, or any contractor or sub-contractor for said department, may employ laborers, workmen, mechanics, foremen and inspectors for more than eight hours in any one day in such construction or reconstruction when, in the opinion of the commissioner of labor and industries, public necessity so requires. Every such contract not containing the aforesaid stipulation shall be null and void.

M.G.L. c. 149, § 44G(D): Weather Protection

(D) Every contract subject to section forty-four A shall include specifications for the installation of weather protection and shall require that the contractor shall install the same and that he shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the commissioner or his designee.

M.G.L. c. 149, § 44F(4)(c): Form of Subcontract

(c) If a selected sub-bidder fails, within five days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, to perform his agreement to execute a subcontract in the form hereinafter set forth with such general bidder, contingent upon the execution of the general contract, and, if requested so to do by such general bidder in the general bid, to furnish a performance and payment bond as stated in his sub-bid such general bidder and the awarding authority shall select, from the other sub-bids duly filed with the awarding authority for such sub-trade and not rejected under [section forty-four H](#) the lowest responsible and eligible sub-bidder at the amount named in his sub-bid as so filed against whose standing and ability the general contractor makes no objection, and the contract price shall be adjusted by the difference between the amount of such sub-bid and the amount of the sub-bid of the delinquent sub-bidder.

The subcontract shall be in the following form:

SUBCONTRACT

THIS AGREEMENT MADE THIS ____ DAY OF ____ 19__, by and between ____ a corporation organized and existing under the laws of ____ an individual doing business as ____ hereinafter called the "Contractor" and ____ a corporation organized and existing under the laws of ____ an individual doing business as ____ hereinafter called the "Subcontractor".

WITNESSETH that the Contractor and the Subcontractor for the considerations hereafter named, agree as follows:

1. The Subcontractor agrees to furnish all labor and materials required for the completion of all work specified in Section No. ____ of the specifications for

(Name of Sub-Trade)

and the plans referred to therein and addenda No. ____, ____, ____, and ____ for the

(complete title of the project and the project number taken from the title page of the specifications)

all as prepared by _____

(Name of Architect or Engineer)

for the sum of _____ (\$_____) and the Contractor agrees to pay the Subcontractor said sum for said work. This price includes the following alternates (and other items set forth in the sub-bid): Alternate No(s). _____, _____, _____, _____, _____, _____, _____, _____, _____, _____, _____

(a) The Subcontractor agrees to be bound to the Contractor by the terms of the hereinbefore described plans; specifications (including all general conditions stated therein) and addenda No. _____, and _____, and _____, and to assume to the Contractor all the obligations and responsibilities that the Contractor by those documents assumes to the _____

(Awarding Authority)

hereinafter called the "Awarding Authority", except to the extent that provisions contained therein are by their terms or by law applicable only to the Contractor.

(b) The Contractor agrees to be bound to the Subcontractor by the terms of the hereinbefore described documents and to assume to the Subcontractor all the obligations and responsibilities that the Awarding Authority by the terms of the hereinbefore described documents assumes to the Contractor, except to the extent that provisions contained therein are by their terms or by law applicable only to the Awarding Authority.

2. The Contractor agrees to begin, prosecute and complete the entire work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute and complete the work described in this subcontract; and, in consideration thereof, upon notice from the Contractor, either oral or in writing, the Subcontractor agrees to begin, prosecute and complete the work described in this Subcontract in an orderly manner and with due consideration to the date or time specified by the Awarding Authority for the completion of the entire work.

3. The Subcontractor agrees to furnish to the Contractor within a reasonable time after the execution of this subcontract, evidence of workmen's compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Awarding Authority by the Contractor.

4. The Contractor agrees that no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten (10) days of the calendar month following that in which the claim originated.

5. This agreement is contingent upon the execution of a general contract between the Contractor and the Awarding Authority for the complete work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement the date and year first above-written.

SEAL

ATTEST _____

(Name of Subcontractor)

By _____

SEAL

ATTEST _____

(Name of Contractor)

By _____

In the event that the contract between the general contractor and the awarding authority does not contain provisions granting to the awarding authority the right to terminate the general contract when the general contractor encounters financial difficulties or fails to make satisfactory progress, the general contractor may insert the following paragraph:

If the Subcontractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Contractor, or otherwise be guilty of a substantial violation of any provision of the contract, then the Contractor may, without prejudice to any other right or remedy and after giving the Subcontractor and his surety, if any, seven days' written notice, terminate the employment of the Subcontractor and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method he may deem expedient. In such case the Subcontractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work including compensation for additional architectural, managerial and administrative services, such excess shall be paid to the Subcontractor. If such expense shall exceed such unpaid balance, the Subcontractor shall pay the difference to the Contractor.

The contractor and subcontractor shall have the right to seek damages for breach of a subcontract without terminating the subcontract or ceasing performance thereunder.

All sub-bidders when finally selected shall be notified in writing of their selection within forty-eight hours thereafter by the general bidder.

In each case of substitution of a sub-bidder for a sub-bidder listed in the general bid of the selected general contractor, the selected general contractor may require the substituted sub-bidder to furnish a performance and payment bond, and the premiums for same shall be added to the general bidder's price for work to be performed by him except where the selected general contractor had indicated in his general bid that the original sub-bidder designated for that sub-trade, in which substitution was made, would be required to furnish such bond.

In the instances enumerated in paragraphs (1), (2) and (3) of this section, the general bidder's price for work to be performed by him shall also be adjusted by the amount of the change in the premium for the general contractor's performance bond and his labor and materials or payment bond caused by the substitution.

M.G.L. c. 149, § 129A: Shoring of Trenches

On any construction project carried on by any city, town, county or other subdivision of the commonwealth in which a trench is to be dug to a depth of five feet or more, except a trench for laying of water pipes dug to a depth of six and one-half feet which will be open less than forty-eight hours, such trench shall be shored and braced in conformity with the rules and regulations for the prevention of accidents in construction operations, as adopted and enforced by the attorney general. This section shall not apply to the digging of graves.

Foreign Corporations, Statutory Reference M.G.L. c. 30, § 39L, M.G.L. c. 181, §§ 3 and 5

The Contractor, if a foreign corporation, shall comply with M.G.L. c. 30, § 39L and M.G.L. c. 181, §§ 3 and 5.

Certification of Compliance with Tax Laws, Statutory Reference M.G.L. c. 62C, §49A

By executing this Contract, the Contractor certifies, under penalties of perjury, that to the best of his information, knowledge and belief he has complied with all laws of the Commonwealth relating to taxes.

Equal Employment Opportunity and Affirmative Action, Statutory Reference M.G.L. c. 151B; M.G.L. c. 7, § 40N; Executive Order Nos. 74, 116, 237, 246 and 390.

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

In connection with the performance of work under this Contract, the Contractor shall fully comply with all applicable obligations set forth in M.G.L. c. 151B; M.G.L. c. 7, § 40N; Executive Order Nos. 74, 116, 237, 246 and 390 regarding non-discrimination and affirmative action.

END OF STATUTORY AND EXECUTIVE ORDER REFERENCES

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 10 00 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Instructions to Bidders, Contract For Completion Of Certain Public Works Or Building Improvements/Maintenance/Repairs in the Town Of Southbridge, and Division 01 General Requirements are bound herein, are hereby made a part of this Section, and shall be binding on the Contractor and all Subcontractors who perform this work.

1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Work sequence.
- 4. Work performed by Owner.
- 5. Owner-furnished/Contractor-installed (OFCI) products.
- 6. Owner-furnished/Owner-installed (OFOI) products.
- 7. Contractor's use of premises.
- 8. Coordination with occupants.
- 9. Work restrictions.
- 10. Specification and Drawing conventions.
- 11. Codes, Standards and Permits.

- B. Related Requirements:

- 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
- 2. Division 01 Section "Execution" for coordination of Owner-installed products.
- 3. Division 02 Abatement Sections for scope of hazardous materials abatement.

1.3 PROJECT INFORMATION

- A. Project Identification: **Southbridge Sr. Center Kitchen Exhaust**

- 1. Project Location: 153 Chestnut St, Southbridge, MA 01550

- B. Owner: Town of Southbridge, MA 41 Elm St, Southbridge, MA 01550

- 1. Owner's Representative: John Jovan Jr., Town Manager
- 2. Architect: The Contract Documents, dated November 12, 2024, were prepared by Kaestle Boos Associates, Inc.

- C. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.

- 1. See Division 01 Section "Project Management and Coordination." for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. *The project includes the renovation of an existing kitchen facilities to add a new commercial hood and associated fan and makeup air unit.*
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 WORK SEQUENCE

- A. General: The Contractor shall utilize the contract documents as the basis for a detailed construction schedule, to be submitted to the Owner, Architect, and Owner's Representative for review and approval. The schedule must clearly demonstrate the proper sequencing of construction and relocation activities, and how operational and environmental conditions will be satisfactorily maintained in all occupied spaces.
- B. The work is to be completed per the following schedule:
 - 1. December 6, 2024 through March 6, 2023
- C. The Sequence of work is to be completed per the following schedule:

1.6 WORK PERFORMED BY OWNER

- A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
 - 1. The Owner's own employees and service contractors may perform maintenance and service functions to construction, furnishings and equipment within the building.
- B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.
 - 1. The owner will install a commercial range for final connection by the contractor.
- C. Contractor's Responsibilities: The Work includes the following, as applicable:

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

1.7 CONTRACTOR USE OF PREMISES

- A. General: Each Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.
- B. Use of Site: Confine operations to areas within Contract limits indicated. Do not disturb portions of the Project site beyond areas in which Work is indicated.
 1. Confine the parking of worker and construction vehicles, and the storage of construction materials to a designated staging area determined by the Owner.
 2. Keep driveways and entrances clear and available to Owner, Owner's employees, and emergency vehicles at all times. Staging at access ways may be required in order to permit completion of the work of this Project. Do not use these areas for parking or storage of materials.
 3. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Building Security: Continuously maintain the security of the building and the Work. Cooperate with the Owner in particularly sensitive areas where security and special safeguards are required.
 1. Provide security guards or patrols as necessary for adequate protection of the interests of the Contractor, Owner, and the general public on the site, or in public ways around the site.
 2. Ensure that all windows, doors and other openings are secured at the end of each work day.
- D. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.
- E. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy Project site and existing]building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than [72] seventy two hours in advance of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- C. On-Site Work Day Restrictions: Do not perform work **resulting in utility** on-site during work black-out days indicated in the construction schedule or directed by the Owner.
- D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 1. Notify [**Construction Manager**] [**Owner**] not less than [**two**] <Insert number> days in advance of proposed utility interruptions.
 2. Obtain [**Construction Manager's**] [**Owner's**] written permission before proceeding with utility interruptions.
- E. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 1. Notify **Owner** not less than [72] seventy two hours in advance of proposed disruptive operations.
 2. Obtain **Owner's** written permission before proceeding with disruptive operations.
- F. Smoking and Controlled Substance Restrictions: Use of tobacco products , **alcoholic beverages,** and other controlled substances on Owner's property is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.

2. CORI Reports: Each and every person in attendance at Project site must complete the CORI Request Form attached at the end of this Section.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Format: The Specifications are organized into Division and Sections using the 48-division format and CSI/CSC's "MasterFormat" numbering system.
 1. Section Identification: The Specifications use Section numbers and title to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- C. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- D. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- E. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
- F. In general, the Specifications will describe the quality of the work and the Drawings, the extent of the work. The Drawings and Specifications are cooperative and supplementary; however, each item of the work is not necessarily mentioned in both the Drawings and the Specifications. All work necessary to complete the project, so described, is to be included in this Contract.

1. Comply with [Division 01 Section “Product Requirements”

- G. In case of disagreement between the Drawings and Specifications, or within either document itself, the Architect shall interpret the Documents to require the better quality or greater quantity of work for the Owner that can reasonably be construed therefrom. Any work performed by the Contractor without consulting the Architect, when the same requires a decision, shall be performed at the Contractor’s risk.

1.11 CODES, STANDARDS AND PERMITS :

- A. All work under this contract shall conform to all codes and standards in effect as of the date of receipt of Bids which are applicable to this Project. All work shall also conform to specific requirements and interpretations of local authorities having jurisdiction over the Project. These Codes, standards, and authorities are referred to collectively as “the governing codes and authorities” and similar terms throughout the Specifications. Determination of applicable codes and standards and requirements of the authorities having jurisdiction shall be the responsibility of the Contractor; as shall be the analysis of all such codes and standards in regard to their applicability to the Project for the purposes of determining necessary construction to conform to such code requirements, for securing all approvals and permits necessary to proceed with construction, and to obtain all permits necessary for the Owner to occupy the facility for their intended use. In the case of conflicts between the requirements of different codes and standards, the most restrictive or stringent requirements shall be met.
- B. The codes that were used in the design of this Project are as follows :
1. Massachusetts State Building Code, 780 CMR – Ninth Edition, including all referenced standards.
 2. National Fire Protection Association (NFPA) codes and standards.
 3. Massachusetts Fire Prevention Regulations, 527 CMR 1.00.
 4. Architectural Access Board 521 CMR, as amended (AAB).
 5. The Americans with Disabilities Act, Title II, including ADA Regulations.
 6. ADA Standards for Accessible Design, 28 CFR 36 (7-1-94 Edition) ADA Accessibility Guidelines (ADAAG)
 7. Section 504, Rehabilitation Act 1973, including 504 Regulations.
 8. Uniform Federal Accessibility Standards, 41 CFR 101-19-6.
- C. Code Enforcement and Approvals: Secure and pay for the general building permit for the work and conform to all conditions and requirements of the permit and code enforcement authorities.
- D. Identify and pay for all permits required from authorities having jurisdiction over the Project for the construction and occupancy of the work. Prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner.
1. Display all permit cards as required by the authorities and deliver legible photocopies of all permits to the Construction Manager and Owner promptly upon their receipt.
 2. Arrange for all inspections, testing and approvals required for all permits. Notify the Owner, Construction Manager and Architect at least three business days in advance, so they may arrange to observe.
 3. Comply with all conditions and provide all notices required by all permits.

4. Perform and/or arrange for and pay for all testing and inspections required by the governing codes and authorities, other than those provided by the Owner, and notify the Owner, Construction Manager, and Architect of such inspections at least three business days in advance, so they may arrange to observe.
5. Where inspecting authorities require corrective work in conjunction with applicable codes and authorities, promptly comply with such requirements, except in cases where such requirements clearly exceed the requirements of the Contract Documents, in which case proceed in accordance with the procedures for modifications to the Work established in the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

3.1 FORMS

- A. The following forms referenced in this Section are attached:

1. Personal Massachusetts Criminal Record Request Form, 7 pages.

END OF SECTION 01 10 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for submitting Requests for Information (RFIs).
 - 2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, as follows:
 - 1. **"Architect's Supplemental Instruction" (ASI)** form, included at end of Part 3, is an Owner/Architect-initiated supplemental instruction.
 - a. Architect's Supplemental Instructions, including attachments, will be issued to the contractor electronically via email, in the form of a "portable document file" (.PDF).

1.4 CONTRACTOR REQUEST FOR INFORMATION

- A. Contractor-Initiated Requests for Information: If clarification is required to the Contract Documents, the Contractor may submit a "Request for Information" (RFI) to the Architect. This request will be responded to by the Architect with a "Response to Request for Information" (RRFI) form.
 - 1. RFI forms shall be submitted in a typewritten, standardized format, including title and description, and sequentially numbered.

2. Submit RFI, including attachments, electronically via email in the form of a “portable document file” (.PDF); fax submittals are not acceptable.
3. RFI forms are not to be submitted as requests for shop drawing approval. Comply with requirements in Division 01 Section “Submittal Procedures.”
4. **“Response to Request for Information” (RRFI)**, included at the end of Part 3, will be issued in response to Contractor’s Request for Information (RFI).
 - a. A Response to Request for Information (RRFI), including attachments, will be issued to the contractor electronically via email, in the form of a “portable document file” (.PDF).
 - b. If the RRFI directs the Contractor to carry out the Work with no change in Contract Sum or Contract Time, but the Contractor anticipates a change associated with the Work, the Contractor must submit to the Architect in writing within 5 days of receipt of the RRFI, the reason for the anticipated change in Contract Sum and/or Contract Time. A change in Contract Time must be submitted with a revised CPM Schedule in accordance with Division 01 Section “Construction Progress Documentation.”

1.5 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 1. **“Proposal Requests” (PR)** included at the end of Part 3, including attachments, will be issued to the contractor electronically via email, in the form of a “portable document file” (.PDF).
 2. **“Proposal Requests” (PR)** issued by the Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 3. Within **21 days** after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float, as required, before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by first submitting a “Request for Information” to the Architect. This request will be responded to by the Architect, wherein the Contractor may submit a Change Order Proposal.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a quote sheet from the supplier as backup for costs.
 3. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 5. Include costs of labor and supervision directly attributable to the change.
 6. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- C. If the Contractor fails to provide proper documentation for merit of the claim / change order request, or if the Contractor does not provide adequate backup documentation for the claim / change order request, the Contractor shall be responsible for any schedule delays due to any time lost waiting for the proper documentation of the claim / change order request.

1.6 CHANGE ORDER PROCEDURES

- A. Change Order Proposal Form: Use **AIA Document G709**, or similar document, for Change Order Proposals.
1. Submit Change Order Proposals (COP), including attachments from vendors and subcontractors and the initiating document, electronically in the form of a "portable document file" (.PDF).
 - a. Change Order Request Costs:
 - 1) The cost or credit to the Owner resulting from a Change in the Work, absent the applicability of a unit price for such item(s) set forth in the Contract shall be determined as follows:
 - a) The cost of material and equipment incorporated into the Work
 - b) The cost of wages, including fringe benefits mandated by collective bargaining agreements.
 - c) Cost of Workers' Compensation, employer Liability Insurance, Federal Social Security (FICA), Federal Unemployment Compensation *FUTA), Commonwealth of Massachusetts Unemployment Compensation (SUTA).
 - d) Cost of Builder's Risk Insurance
 - e) Cost of rental of equipment whose purchase price is greater than two hundred fifty dollars (\$250.00). Cost of rental shall be substantiated by invoice for the actual rental cost; or in the case where the equipment is owned, the cost shall include the daily, weekly and

- monthly rates for such equipment. The applicable rate shall be as mutually agreed by the Contractor and Owner
- f) Cost of fuel consumed by equipment used in the performance of the Work if not included in the publicized rate
 - g) Cost of pro rata share of debris removal and dumpster rental. This cost shall be allowed only when the debris removal is associated with Work such as demolition but shall not be allowed as part of general cleanup.
 - h) Cost of a foreman that does not work with the tools. This cost shall be allowed if the crew size of a respective trade exceeds a combined total of six journeymen and apprentices. In such instances the total of the foreman's hours may not exceed one sixth of the hours of the working crew.
 - i) Cost of project management, site management field office personnel, superintendence, field coordination, superintendent's truck, foremen's truck, uniforms, mileage, mailings/copying, and as-build drawings shall be included in overhead and profit, and shall not be allowed as separate line items.
 - j) Costs of small tools whose individual cost is less than two hundred fifty dollars (\$250.00) shall be included in overhead and profit, and shall not be allowed as separate line items.
 - k) Cost of cleanup shall be included in overhead and profit, and shall not be allowed as a separate line item unless the Work is performed in a portion of the building or site that has been previously cleaned, inspected by the Architect, and is ready for occupancy by the Owner.
 - l) Cost of revisions to shop drawings shall not be allowed as a separate line item unless the shop drawings have been previously submitted.
 - m) All other costs which are not specifically enumerated in Section 7.2.3 shall be included in overhead and profit, and shall not be allowed as separate line items.
- 2. Each Change Order Proposal is to include reference to the initiating document (PR, RRFI, etc.), a title and description, and be sequentially numbered.
 - 3. **"Response to Change Order Proposal" (RCOP)**, included at the end of Part 3, will be issued in response to Contractor's Change Order Proposal (COP).
 - a. A Response to Change Order Proposal (RCOP) will be issued to the Contractor electronically via email, in the form of a "portable document file" (.PDF).
 - b. Following review of a COP by the Architect, if corrections are required prior to inclusion in a Change Order, resubmit revised COP with revision number and include all backup documentation and the initiating document.
- B. On Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor on **AIA Document G701**, or similar document.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on **AIA Document G714**. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit a Change Order Proposal associated with the Work of a Construction Change Directive, including an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
 - 2. The Architect will prepare a Change Order upon approval by the Architect and Owner of a Change Order Proposal.
- C. Failure of Contractor and Owner to agree on adjustment of Contract Sum or Contract Time shall not excuse the Contractor from proceeding with prosecution and performance of Work. Contractor and Subcontracts, Sub-subcontractors and Suppliers shall administer all disputes in a manner that will permit Work to proceed on schedule while matter in dispute is being resolved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FORMS

- A. The following forms referenced in this Section are attached:
 - 1. ASI – Architect’s Supplemental Instructions, 1 page.
 - 2. RRFI – Response to Request for Information, 1 page.
 - 3. PR – Proposal Request, 1 page.
 - 4. RCOP – Response to Change Order Proposal, 1 page.

END OF SECTION 01 26 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

ASI - ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS

PROJECT

City, State

KBA #

Page: 1 of 1

CONTRACTOR: **GENERAL CONTRACTOR OR CM**
(or CM)

Address
City, State, Zip
Attn: M.

ASI NO. (3 digit)-(2 digit)

ISSUED BY: (Name and Credentials)
 (Project Architect, Landscape Architect, etc.)

DATE: (Month, Day, Year)

COPIES TO:

- ☐ KBA – CT/MA
 - ☐ Owner
 - ☐ Official
 - ☐ Consultant
 - ☐ Consultant
-

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor believes that additional cost or time is involved, the Contractor shall make Claims as provided in the General Conditions of the Contract.

Description: ASI Title

Description of work.....

Attachments: Sketches, Bulletins, etc.

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

PR – PROPOSAL REQUEST

N. ACTON FIRE STATION
Acton, MA

KBA #19008.00
Page: 1 of 1

CONTRACTOR: **NAME**
 Address
 City, State, Zip
 Attn: M.

PR NO. (3 digit)-(2 digit)

ISSUED BY: (Name)
 (Title)

DATE: (Month, Day, Year)

COPIES TO:

- ☐ KBA – CT/MA
☐ Owner
☐ Official
☐ Consultant
☐ Consultant

Please submit an itemized quotation for changes in the Contract Sum and/or Contract Time for proposed modifications to the Contract Documents described herein. Notify the Architect in writing of the date on which you anticipate submitting your proposal.

THIS IS NOT A CHANGE ORDER, CONSTRUCTION CHANGE DIRECTIVE, OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.

Description: (PR Title)

(Text.....)

Attachments:

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

RRFI – RESPONSE TO REQUEST FOR INFORMATION

PROJECT

City, State

KBA #

Page: 1 of 1

**CONTRACTOR:
(or CM)**

GENERAL CONTRACTOR OR CM

Address
City, State, Zip
Attn: M.

RRFI NO.: (3 digit)-(2 digit)

ISSUED BY:

(Name and Credentials)
(Project Architect, Landscape Architect, etc.)

COPIES TO:

- ☐ KBA – CT/MA
- ☐ Owner
- ☐ Official
- ☐ Consultant
- ☐ Consultant

DATE:

(Month, Day, Year)

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor believes that additional cost or time is involved, the Contractor shall make Claims as provided in the General Conditions of the Contract.

Description: RRFI Title

Response.....

Attachments: RFI #

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit prices.
 - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 3. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of **Contractor's** construction schedule.
 - 1. Correlate line items in Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Contractor's Construction Schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than **[ten]** days before the date scheduled for submittal of initial Applications for Payment. No payment shall be processed until schedule of values has been submitted and approved by the Architect.

- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section. For major trades with line-item values exceeding **\$20,000** provide separate line items for identifiable units of work within such trade with a value not exceeding **\$10,000**. Provide separate line items for labor and material.

1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Owner's Project number.
 - d. Name of Architect.
 - e. Architect's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
2. Arrange schedule of values consistent with format of **[AIA Document G703]**.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum. Include the following mandatory line items:
 - a. Mobilization.
 - b. Demobilization.
 - c. Builders Risk Insurance.
 - d. Bonds.
 - e. Scheduling.
 - f. Construction Photographic Documentation.
 - g. Field Engineering.
 - h. Daily Building Cleanup.
 - i. Daily Site Cleanup.
 - j. Safety Program.
 - k. Project Manager.
 - l. Project Superintendent.
 - m. Dumpsters.
 - n. Cold Weather Protection.
 - o. Submittals or Shop Drawings.
 - p. Closeout.
 - q. Change Orders.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing, along with any additional information required by the Owner.
5. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
8. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
9. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive. Previously approved Schedule of Value line items shall remain unchanged in the revised Schedule of Values.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner and Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the first of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 1. Submit draft copy of Application for Payment Ten (10) days prior to due date for review by Architect.
- D. Application for Payment Forms: Use **AIA Document G702** and **AIA Document G703** as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of approved Change Orders issued before last day of construction period covered by application. Include Construction Change Directives only when agreed to by the Owner and Architect.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored offsite. Payment of offsite materials is at the sole discretion of the owner. Stored material must be inside and out of the weather and protected from infestation by vermin.
1. For offsite materials provide the following:
 - a. Certificate of insurance for the stored materials listing the owner as the insured. The value on the certificate of insurance shall correspond to the billing value on the SOV. If multiple items are stored, then list the value of each item on the Certificate or on an attachment to the certificate. Umbrella insurance for the site is not acceptable.
 - b. Evidence of transfer of title to Owner
 - c. Consent of surety to payment for stored materials.
 - d. Photographic Documentation of the materials labeled and segregated for the project.
 - e. Location of the materials and local contact for inspection by the owner. Inspection by the Owner's representative shall be at the discretion of the Owner and is not required of the Owner.
 - f. Location of the stored material must be within the conterminous United States.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide in a separate table, summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Products list (preliminary if not final).
 5. Sustainable design action plans, including preliminary project materials cost data.
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of Contractor's staff assignments.
 9. List of Contractor's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction conference.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Division 01 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Request for Information (RFIs).
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
 - 7. Commissioning
- B. Related Requirements:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
 - 4. Division 01 Section "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within ten days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities, list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office and in web-based Project software directory. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, services, and repair of all components, including mechanical and electrical.
 5. No claims for additional compensation or extension of Contract Time will be permitted for conditions resulting from lack of coordination.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to

- accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 - d. Indicate maintenance boundary zones around equipment so that other trades can accommodate their design.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - e. Clearances required for recessed lighting fixtures.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
 3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.

4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
 5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
 6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.
- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format:
 - a. Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using **PDF** format.
 3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit and CAD files.
 - c. Contractor shall execute a data licensing agreement in the form of the Electronic Files Release and Liability Waiver included at the end of this Section.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Owner name.

3. Owner's Project number.
 4. Name of Architect and Construction Manager.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 4:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or Construction Manager of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing per the provisions of the General Conditions.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project management software. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect and Construction Manager.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's and Construction Manager's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within five days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model and CAD drawings will be provided by Architect for Contractor's use during construction.
 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in Revit and CAD format.
 4. Contractor shall execute a data licensing agreement in the form of Electronic Files Release and Liability Waiver included at the end of this Section.
 - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Electronic Files Release and Liability Waiver included at the end of this Section.
 5. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
 - c. Elevations.
 - d. Roof plans.

- B. Web-Based Project Management Software Package: Provide, administer, and use a web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project management software includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
 2. Provide Project management software user licenses for use of Owner , Architect, and Architect's consultants. Provide software training at Architect's office for web-based Project software users.
 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file in accordance with its related section.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: **Schedule and conduct** meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of **seven** <7> days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within **three** <3> days of the meeting.
- B. Preconstruction Conference: **Schedule and conduct** a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than **15** days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Contract signing.
 - b. Team contact list and emergency numbers.
 - c. Securing of building permit.
 - d. Application for Payment procedures.
 - 1) Payment of offsite material.
 - 2) Certified payroll affidavits.
 - 3) Cash flow schedule.
 - e. Coordination drawings.
 - f. Daily construction reports.
 - g. Testing requirements.
 - h. Responsibilities and personnel assignments.
 - i. Tentative construction schedule.
 - j. Phasing.
 - k. Critical work sequencing and long lead items.
 - l. Designation of key personnel and their duties.
 - m. Lines of communications.
 - n. Use of web-based Project software.
 - o. Procedures for processing field decisions, claims and Change Orders.
 - p. Procedures for RFIs.
 - q. Procedures for testing and inspecting.
 - r. Procedures for processing Applications for Payment.
 - s. Distribution of the Contract Documents.
 - t. Submittal procedures.
 - u. Preparation of Record Documents.
 - v. Use of the premises and existing building.

- w. Work restrictions.
 - x. Working hours.
 - y. Owner's occupancy requirements.
 - z. Responsibility for temporary facilities and controls.
 - aa. Procedures for moisture and mold control.
 - bb. Procedures for disruptions and shutdowns.
 - cc. Construction waste management and recycling.
 - dd. Parking availability.
 - ee. Office, work, and storage areas.
 - ff. Equipment deliveries and priorities.
 - gg. First aid.
 - hh. Security.
 - ii. Progress cleaning.
 - jj. Owner furnished and provided items.
 - kk. Work performed under separate contracts.
- 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
 - 4. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 5. Agenda: Discuss items of significance that could affect meeting sustainable design requirements, including the following:
 - a. General requirements for sustainable design-related procurement and documentation.
 - b. Project closeout requirements and sustainable design certification procedures.
 - c. Role of sustainable design coordinator.
 - d. Construction waste management.
 - e. Construction operations and sustainable design requirements and restrictions.
 - 6. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.

- c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility requirements.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written instructions.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than **15** days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, [**Owner's Commissioning Authority,**] [**Construction Manager,**] Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.

- d. Submittal of written warranties.
 - e. Submission of all special inspections sign-offs/reports.
 - f. Requirements for completing sustainable design documentation.
 - g. Requirements for preparing operations and maintenance data.
 - h. Requirements for delivery of material samples, attic stock, and spare parts.
 - i. Requirements for demonstration and training.
 - j. Requirements for commissioning.
 - k. Preparation of Contractor's punch list.
 - l. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - m. Submittal procedures.
 - n. Owner's partial occupancy requirements.
 - o. Installation of Owner's furniture, fixtures, and equipment.
 - p. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at biweekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next 3 weeks.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.

- 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FORMS

- A. The following forms referenced in this Section are attached:
 1. Electronic File Release and Liability Waiver, 1 page.

END OF SECTION 013100

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

ELECTRONIC FILES USE AND LIABILITY WAIVER

At the request of the Contractor, Kaestle Boos Associates, Inc. (KBA) agrees to provide you with electronic files developed by KBA for the above referenced project ("the Project") for your use and convenience for this project exclusively and subject to the following terms and conditions:

KBA's electronic files are compatible with Revit 2024 . KBA makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of KBA's instruments of service and must not be used by the undersigned for any purpose other than as a convenience and reference for the Project and shall not be used in place of Contract Documents. Each party receiving these files is required to sign this waiver. Any other use by others will be at the sole risk of the undersigned without liability or legal exposure to KBA. By signing this document, the undersigned agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against KBA, its officers, directors, employees, agents or subconsultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless KBA from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not Contract Documents. Significant differences may exist between these electronic files and corresponding hard copy Contract Documents due to addenda, change orders or other revisions. KBA makes no representation regarding the accuracy or completeness of the electronic files. In the event that a conflict arises between the Contract Documents prepared by KBA and electronic files, the signed contract documents shall govern. KBA shall not be held responsible for determining if any conflict exists. The use of these electronic files, shall not relieve the duty of the Contractor to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work with that of other contractors for the project.

Because of the potential that the information contained in the electronic files can be modified, unintentionally or otherwise, KBA reserves the right to remove all indicia of its ownership and/or involvement from the electronic files.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by KBA and KBA makes no warranties, either express or implied, of merchantability or fitness for any particular purpose. In no event shall KBA be liable for any loss of profit or any consequential damages.

Agreed to by,

CONTRACTOR – COMPANY NAME

TRADE

COMPANY OFFICER - [PRINT NAME]

SIGNATURE

TITLE

DATE

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup (preliminary) construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily field construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.
 - 8. Two Week Lookahead
 - 9. Submittal Schedule
 - 10. Special Reports
 - 11. Certified Payroll Reports
- B. Related Requirements:
 - 1. Division 01 Section "Quality Requirements" for schedule of tests and inspections.
 - 2. Division 01 Section "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
 - 3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.

- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or a similar significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- J. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file.
 - 2. PDF file.
- B. Startup construction schedule.
 - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Submittal Schedule: Submit electronic copy, PDF, of schedule within 15 days of notice to proceed, prior to commencement of work other than preparation of temporary facilities. Arrange the following information in a tabular format.

1. Scheduled date for first submittal
 2. Specification section number and title
 3. Submittal category (action or informational)
 4. Name of subcontractor
 5. Description of the work covered
 6. Scheduled date for Architect's final release or approval
- D. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- E. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule "initial or updated" and date on label.
- F. CPM Reports: Concurrent with CPM schedule, submit electronic copy of each of the following reports to Architect and Owner's Project Manager (OPM). Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 3. Total Float Report: List of activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- G. Construction Schedule Updating Reports: Submit with Applications for Payment.
- H. Daily Construction Reports: Submit at **weekly** intervals to Architect and OPM.
- I. Material Location Reports: Submit at **weekly** intervals to Architect and OPM.
- J. Site Condition Reports: Submit to Architect and OPM at time of discovery of differing conditions.
- K. Unusual Event Reports: Submit to Architect and OPM at time of unusual event.
- L. Certified Payroll Records: Submit electronic copies at weekly intervals to OPM.
- M. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Approval of contractor's construction schedule and network is advisory only and does not relieve the contractor of the responsibility for completing the work within the contract time. Approval by the OPM is not an endorsement of the success of the construction schedule, nor shall it make the OPM liable for time or cost overruns as a result of potential shortcomings.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.
- B. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
 - 1. In the case of interference between the operations of separate contractors, owner, through Owner' representative (OPM), will determine the work priority of each contractor and the sequence of work necessary to expedite completion of project.
- C. Calendar: Compile a project calendar for use in scheduling. Incorporate all limitations on working days and working hours, including the following:
 - 1. Legal holidays
 - 2. Other non-working days determined by the contractor
 - 3. Optional working days determined by the contractor

1.7 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
4. Update the submittals schedule periodically as the work progresses. Submit concurrently with each Application for payment.
5. Utilize a computerized program such as Primavera Expedition or Prolog for tracking submittals or web-based project management software directory as indicated in Division 01 "Project Management and Coordination". Submit the following reports bi-weekly:
 - a. Complete list of reviewed submittals.
 - b. Listing of submittals to date.
 - c. Listing of approved submittals.
 - d. Listing of rejected submittals.
 - e. Listing of submittals returned for correction.
 - f. List of outstanding submittals.
6. At the request of the Architect or Owner's Representative, provide reports capable of being sorted by the following criteria:
 - a. Approved status.
 - b. Subcontractor/Supplier.
 - c. Submission date.
 - d. Number of days late for return.
 - e. Number of days under review.

1.8 CONTRACTOR'S CONSTRUCTION SCHEDULE - GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 1. Utilize current versions of Primavera or Prolog type scheduling programs compatible with Owner's Representative's scheduling program for Windows based software or as specifically directed below. Scheduling capabilities to include the following:
 - a. Unique activity identification number permanently associated with each activity.
 - b. Ability to track critical path through subprojects and overall schedule.
 - c. Predecessor and successor reporting.
 - d. Information content associated with each activity.
 - e. Views of network, cost loading, resource allocation and leveling.
 - f. Float analysis and handling.
 - g. Cost tracking.
 - h. Progress reporting and revisions.
 - i. Reporting content.
 - j. Flexibility and formatting.
 - k. Electronic data export.

2. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 3. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than **20** days, unless specifically allowed by Architect.
 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery. Procurement activity duration may exceed 10 days, subject to review by Owner's Representative.
 4. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 5. Startup and Testing Time: Include no fewer than 5 days for startup and testing.
 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - i. Startup and placement into final use and operation.
 - j. Commissioning.
 6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
 7. Other Constraints: Include the following specific activities in each trade in each phase.
 - a. Interface between Contractor and Subcontractor.
 - b. Electrical connections to each piece of equipment.
 - c. Mechanical connection to each piece of equipment.
 - d. Site work constraints on other activities.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
 2. Contractor shall assign cost to construction activities on the CPM schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance

- manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
3. Each activity cost shall reflect an accurate value subject to approval by Architect.
 4. Total cost assigned to activities shall equal the total Contract Sum.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before submission of Application for Payment.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.
- J. Recovery Schedule: When periodic update indicates the Work is **14** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- K. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- L. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- M. .

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 10 days of date established for the Notice to Proceed.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in **10** percent increments within time bar.
- C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity.
 - 2. Description of activity.
 - 3. Main events of activity.
 - 4. Immediately preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
 - 10. Dollar value of activity (coordinated with the schedule of values).
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.
- F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
 - 1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 - 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.

3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts **one week** before each regularly scheduled progress meeting.

G. SCHEDULE COMPLIANCE

1. Whenever it becomes apparent from the current CPM schedule that delays to the critical path have resulted and Contract completion date will not be met, or when so directed by the Owner's Representative, take some or all of the following actions at no additional cost to the Owner:
 - a. Submit to the Owner's Representative, a written recovery statement of proposed methods to remove or arrest delay to critical path in approved schedule, and a proposed schedule with the corresponding revisions in activities and logic ties.
 - b. Increase construction manpower as necessary to substantially eliminate backlog of work.
 - c. Increase the number of working hours per shift, shifts per day, working days per week, amount of construction equipment, or any combination therefore, sufficiently to substantially eliminate backlog of work.
 - d. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with revised schedule.
2. If Contractor fails to submit a written statement of proposed methods or fails to take such steps as requested and approved by the Owner's Representative, the Owner may direct the Contractor to increase the level of effort in manpower (trades), equipment and work schedule including overtime, weekend and holiday work, to be employed by Contractor in order to remove or arrest delay to the critical path in approved schedule.
 - a. The Contractor shall promptly provide such level of effort at no additional cost to the Owner.
3. Contractor's failure, refusal or neglect to promptly comply with these schedule recovery requirements shall be reasonable evidence that Contractor is not prosecuting the Work with due diligence. Any such failure, refusal or neglect shall give sufficient basis to the Owner to elect any of the following:
 - a. Demand adequate written assurance of due performance, as provided in the General Conditions;
 - b. Withhold liquidated damages, and;
 - c. At the Owner's sole discretion, direct alternate schedule recovery actions.

H. ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

1. If Contractor desires to make changes in its method of operating which affect the approved CPM schedule, notify the Owner's Representative in writing, stating the nature of and reason for the proposed changes. Revise and resubmit the CPM schedule only after proposed changes are approved by the Owner's Representative. Adjustment may consist of changing portions of the activity sequence, activity durations, division of approved activities, or other adjustments as may be approved by the Owner's Representative.
 - a. Addition of extraneous, nonworking activities, or activities which add unapproved constraints to the CPM schedule will not be approved.

- b. Make all revisions to the CPM schedule without any additional cost to the Owner.
2. If completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, submit a schedule adjustment to the Owner's Representative for approval, showing each activity divided into two activities reflecting completed and uncompleted work.
3. Immediately reschedule with added activities shown on the schedule, Shop Drawings which are not approved on the first submittal or within schedule time, and equipment which does not pass specified tests.
4. Submit requests for any extension of Contract completion date to Owner's Representative for approval, including such justification and supporting evidence as Owner's Representative may deem necessary to determine whether Contractor is entitled to an extension of time under provisions of this Contract. The Owner's Representative will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof.
 - a. The total number of days of extension to which the Contractor is entitled, if any, will be determined by the Owner's Representative, based upon the currently approved CPM schedule and on all data relevant to extension.
 - b. Actual delays in activities which, according to the CPM schedule, do not affect any Contract completion date shown by critical path in the network will not constitute basis for a change therein.
5. Subject to the provisions of the General Conditions of the Contract and other Division 01 Sections, submit each request for change in Contract completion date to the Owner's Representative within 20 calendar days after beginning of delay for which a time extension is requested but before date of final payment under this Contract. No extension will be granted for requests which are not submitted within the aforementioned time limit.
 - a. In the case of Contractor claims for delays in the work due to causes beyond the Contractor's control, demonstrate by recalculating the progress schedule to indicate the actual effect on related activities. Only interferences with specific work activities that, through correct network analysis, result in a net increase in the critical path will be allowed. Extension of time shall be determined through analysis of the progress schedule.
 - b. From time to time it may be necessary for the project schedule or completion time to be adjusted, as directed by the Owner, to reflect effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on part of the Owner or its representatives, and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, Owner's Representative will direct the Contractor to reschedule the work or Contract completion time to reflect changed conditions.
 - 1) Revise and recalculate the schedule accordingly to indicate the actual effect on related activities.
6. Float: If the Progress Schedule anticipates early completion of entire Work or any portion of the Work with a separate Contract Time, Contract Float is the number of days between the anticipated date for completion of the Work, or any such portion of the Work, and the corresponding Contract Time. Proceed with the Work according to early start dates. Owner's Representative shall have the right to apportion float time according to the needs of the Project.
 - a. Contractor agrees that actual delays affecting paths of activities containing float time will not have any affect upon Contract completion times, providing that actual delay does not exceed float time associated with those activities.

1.10 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Unusual events.
 11. Stoppages, delays, shortages, and losses.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. Construction Change Directives received and implemented.
 17. Services connected and disconnected.
 18. Equipment or system tests and startups.
 19. Partial completions and occupancies.
 20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at the Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within **one** day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

1.11 CERTIFIED PAYROLL RECORDS

- A. In compliance with M.G.L. Chapter 149, the General Contractor and each Subcontractor is required to submit a certified payroll with a statement of compliance on a weekly basis.
 - 1. Certified Payroll: Submit Massachusetts Department of Labor and Workforce Development "Weekly Payroll Report", typewritten.
 - 2. Certificate of Compliance: Submit Massachusetts Department of Labor and Workforce Development "Weekly Payroll Records Report and Statement of Compliance" form, typewritten.
- B. The Owner has the authority to verify payroll reports by checking employees' pay stubs and personal identification.
- C. The Owner may withhold a portion of the Application for Payment if payroll reports have not been submitted for a portion of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section Includes:

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

- B. Related Requirements:

- 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 5. Division 01 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 6. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 7. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 8. Divisions 02 through 48 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

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

- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect [and Construction Manager].
 3. Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- B. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name and address of Architect.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.
 6. Names of subcontractor, manufacturer, and supplier.
 7. Submittal number or other unique identifier, including revision identifier.
 - a. Submittal number shall include the Specification Section number followed by a hyphen and the sequence number for that Specification Section, followed by a hyphen and the review number (i.e.: The fourth item submitted under Section 061053 which is being resubmitted after an initial review by the Architect would be numbered as 061053-004-Rev 02).
 - b. Submittals that are required by Specification Sections included in Division 01 shall include the Division 01 Section number, followed by a hyphen and the construction Specification Section number, followed by a hyphen and the sequence number for that Specification Section, followed by a hyphen and the review number. (i.e.: If the Maintenance Manual for the Hydraulic Elevator were the first item being submitted as a closeout document in Section 142400, it would be numbered as 017823-142400-01-Rev 01).
 8. Paragraph number from Part 2 of the appropriate Specification Section.
 9. Drawing number and detail references, as appropriate.
 10. Location(s) where product is to be installed, and/or proposed use of the product, as appropriate.
 11. Other necessary identification.
- C. Metadata: Include the following information as keywords in the electronic submittal file metadata:
1. Project name.
 2. Number and title of appropriate Specification Section.
 3. Manufacturer name.
 4. Product name.
- D. Options: Identify options requiring selection by Architect.
- E. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

- F. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other formats approved by Architect.

1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
 2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow **15** days for initial review of each submittal. Allow two (2) additional weeks for review of architectural submittals that require plumbing, HVAC, electrical, fire protection and structural work to complete the installation. Allow additional time if coordination with subsequent submittals is required. **Architect** will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow **15** days for review of each resubmittal. Allow two (2) additional weeks for review of architectural submittals that require plumbing, HVAC, electrical, fire protection and structural work to complete the installation.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's [action stamp.
- E. Distribution: Furnish final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Statement of compliance with specified referenced standards.
 - f. Testing by recognized testing agency.
 - g. Application of testing agency labels and seals.
 - h. Notation of coordination requirements.
 - i. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.

- d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.

- a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit **three** sets of Samples. Architect will retain **two** Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **three** sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit **digitally signed PDF file** signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with the provided "Combined Contractor/Construction Manager/KBA Inc. Shop Drawing Review Stamp" attached at the end of this Section.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect [and Construction Manager] will review each submittal, indicate corrections or revisions required, and return. Architect will indicate, via markup on each submittal, the appropriate action.
 - 1. "Approved": The portion of Work covered by the submittal may proceed provided it complies with the Contract Documents.
 - 2. "Approved as Corrected": The portion of Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal, and with the Contract Documents.
 - 3. "Revise and Resubmit": Revise submittal in accordance with notations; resubmit. Do not proceed with that portion of the Work covered by the submittal.
 - 4. "Not Approved": Submittal not approved for use on project. Prepare new submittal in accordance with notations. Do not proceed with that portion of the Work covered by the submittal.

- B. Informational Submittals: Where a submittal is for information, record purposes or special processing or other activity, the Architect will review each submittal, and will mark it “Reviewed”/”No Action Taken”/”Received for Record” or will return it if it does not comply with requirements.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will **return without review** submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

COMBINED CONTRACTOR AND K.B.A. INC. SUBMITTAL REVIEW STAMP

PROJECT NAME: _____	
SPEC. SECTION NO.: _____	
PARAGRAPH NO.: _____	
SUBMITTAL NO.: _____	
REVISION NO.: _____	
TITLE: _____	
CONTRACTOR: _____	
CONTRACTOR HAS DETERMINED AND VERIFIED MATERIALS, FIELD MEASUREMENTS AND FIELD CONSTRUCTION CRITERIA AND HAS CHECKED AND COORDINATED THE INFORMATION CONTAINED IN THIS SUBMITTAL WITH THE REQUIREMENTS OF THE WORK AND OF THE CONTRACT DOCUMENTS AND RECOMMENDS APPROVAL BY THE ARCHITECT/ ENGINEER.	
BY: _____ DATE: _____	
KAESTLE BOOS ASSOC. PROJECT NO.: _____	
ARCHITECT / ENGINEER	
DATE RECEIVED STAMP:	
COMMENTS MADE ON THE SUBMITTAL DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH REQUIREMENTS OF THE CONTRACT DOCUMENTS. REVISING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE; FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESSES OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES OF CONSTRUCTION; AND FOR COORDINATION OF THIS WORK WITH THE WORK OF ALL TRADES.	
ARCHITECT'S ACTION STAMP:	
DISTRIBUTION STAMP:	

↑
TO BE FILLED IN BY THE CONTRACTOR

TO BE FILLED IN BY KAESTLE BOOS ASSOC., INC.

↓

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 40 00 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary".

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction. See individual Sections for requirements.

- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 - 1. Mockups are used for one or more of the following:
 - a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.
 - d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
 - 2. Approved mockups establish the standard by which the Work will be judged.
 - 3. Approval of mockups do not constitute approval of deviations from the Contract Documents.
 - 4. Mockups must be approved for construction prior to starting associated work.
 - 5. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 - 6. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirements. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

- A. Mockup Shop Drawings:
 - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.

- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY -CONTROL PLAN

- A. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- B. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- C. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and

- inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- D. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- E. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.

6. Statement of whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections;

and, where required by authorities having jurisdiction, that is acceptable to authorities.

- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.11 QUALITY CONTROL

- 1. The Owner reserves the right to have the following inspections performed by the Commissioning Agent, or other consultant:
 - a. Infrared thermal scan of building envelope at project completion with HVAC systems running at operation temperature.
 - b. Infrared thermal scan of completed membrane roofing system.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents. The Contractor is responsible to pay for all retesting.
 - 1. Retesting to be performed by the Inspection and Testing Agency that performed the original tests.
 - 2. Retest original failed test and perform two additional tests at new locations to be determined by Architect and Testing Agency.
 - 3. Continue retesting until compliance is achieved.
 - 4. Field testing shall be repeated at original location of failed test until compliance is demonstrated.
- D. Manufacturer's Field Services: Where indicated, engage a factory -authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions,

verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- F. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and for testing and inspection equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality -assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

RETAIN FIRST SUBPARAGRAPH ONLY WHEN RETAINING "SPECIAL INSPECTOR" OPTION IN "SPECIAL TESTS AND INSPECTIONS" PARAGRAPH ABOVE.

2. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
3. Notifying Architect [, **Commissioning Authority,**] [, **Construction Manager,**] and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
4. Submitting a certified written report of each test, inspection, and similar quality -control service to Architect [**and Commissioning Authority**] [, **through Construction Manager,**] with copy to Contractor and to authorities having jurisdiction.
5. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
6. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
7. Retesting and reinspecting corrected Work.
 - a. Costs associated with retesting and reinspecting are the responsibility of the contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of Contractor and Owner tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are the Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 42 00 – REFERENCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms, including "requested," "authorized," "selected," "required," and "permitted," have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms, including "shown," "noted," "scheduled," and "specified," have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J. “Engage”: To provide the services of: hire.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of

the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on the Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from a publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities responsible for the standards and regulations.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and regulations.
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 — TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
 - 1. Temporary utilities required include but are not limited to:
 - a. Water service and distribution.
 - b. Temporary electric power and light.
 - c. Telephone service.
 - 2. Temporary support facilities required include but are not limited to:
 - a. Sanitary facilities, including drinking water.
 - b. Temporary enclosures.
 - c. Hoists and manlifts.
 - d. Temporary project signs.
 - e. Waste disposal services.
 - f. Rodent and pest control.
 - g. Construction aids and miscellaneous services and facilities.
 - h. Scaffolding.
 - i. Dust control.
 - 3. Security and protection facilities required include but are not limited to:
 - a. Temporary fire protection and fire watch.
 - b. Barricades, warning signs, lights.
 - c. Enclosure fence for the construction area.
 - d. Environmental protection.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
 - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 01 Section "Execution" for progress cleaning requirements.
 - 4. Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: **Owner will pay** sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: **Owner will pay** water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: **Owner will pay** electric-power-service use charges for electricity used by all entities for construction operations.
- E. Gas Power Service: **Owner will pay** propane/natural gas use charges for gas used by all entities for construction operations.
- F. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services and metering as required for construction operations.
- G. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
 - 1. Show the following, including, but not limited to, fencing, gates, trailers, storage, staging/lay down, signs, temporary toilets, and dumpsters; site access and site entrance mat/anti-tracking pad; traffic on site; and contractor parking including minimum visitor parking spaces. Show locations and coverage of site lighting; include method for control of lighting during prohibited hours. Indicate dates when each of the temporary facilities outside the building will be put in place and when they will be removed. Provide other related information requested by the Architect or Project Manager. Plan shall be coordinated and approved by Owner and Local Authorities Having Jurisdiction.
- B. Implementation and Termination Schedule: Within **15** days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption, damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.
- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
- H. Temporary Egress Plans: Show temporary egress plans for each phase of construction. Submit plans to the Authority Having Jurisdiction for review and approval. Submit for project record.

1.5 QUALITY ASSURANCE

- A. General: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to the following:
 - 1. Current State Building and Fire Codes at date of permit and referenced standards.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.

4. Police and Fire Department rules and regulations.
5. Environmental Protection Agency regulations.
- B. Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", OSHA Part 1926, Construction Safety and Health Regulations, and NECA Electrical Design Library "Temporary Electrical Facilities."
- C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
 1. All temporary electrical work shall meet the requirements of the Massachusetts Electrical Code Article 305 Temporary Wiring, the Local Utility Company, and all Federal Standards and Laws.
- D. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits. All associated costs are the responsibility of the Contractor.
- E. Accessible Temporary Egress: Comply with applicable provisions in building code and federal regulations.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.
- C. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- D. Prevention of Fire: Take all necessary precautions for the prevention of fire during construction. Keep the area within the contract limits orderly and clean and promptly remove combustible rubbish from the site.
 1. Store combustible materials on the site only as established in the Contractor's approved Safety Plan.
 2. Comply with all suggestions, official recommendations, and lawful requirements of the local fire department regarding fire protection.
 - a. The General Contractor is responsible to arrange and pay for a fire watch for all non-filed sub bid trade work when required by the local fire department. The General Contractor and subcontractors are required to apply for a permit to do hot work and

must present a valid NFPA Hot Work Safety Program Certification as required by the State of Massachusetts.

- E. Provide and maintain in good working order under all conditions, suitable and adequate fire protection equipment and services.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts[, with 1-5/8-inch- (42-mm-) OD top rails] [, with galvanized barbed-wire top strand].
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, 9-gage, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide [concrete] [galvanized-steel] bases for supporting posts.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- D. Wood Enclosure Fence: Plywood, [6 feet (1.8 m)] [8 feet (2.4 m)] high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.
- E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).
- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively
- H. Wood framing and plywood: Provide fire retardant treated dimensional lumber for framing and 3/4"thick exterior grade plywood. Comply with Division 06 Section "Miscellaneous Rough Carpentry".
 - 1. For temporary signs and directory boards, provide exterior type, Grade B-B high density concrete form overlay plywood conforming to PS-1, of sizes and thickness indicated.
- I. Paint: Comply with requirements of Division 09 Section "Painting."

1. For temporary sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.
- J. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
- C. General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- D. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
- E. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress outside of the building, or lengths of electric cords less than 50 ft. are used within the building.
- F. Electrical Outlets: The General Contractor shall provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- G. Lamps and Light Fixtures: The General Contractor shall provide general service lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- H. Heating Equipment: Unless Owner authorizes use of permanent heating system, the General Contractor shall provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- I. Fire Extinguishers: Provide hand-carried, portable UL-rated, class “A” fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class “ABC” dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Division 01 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
1. Prior to commencing work, isolate the HVAC system in area where work is to be performed
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.
- D. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 1. Connect temporary service to Owner's existing power source, as directed by Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Temporary Lighting and power:
 1. Whenever roof deck exists or has been installed, the General Contractor shall provide temporary lighting with local switch.
 2. Install and operate temporary lighting that shall fulfill security and protection requirements, without operating the entire system, and shall provide adequate illumination for construction operations and traffic conditions.
 3. Night Lighting: Provide adequate outdoor lighting to illuminate security zones, staging, stockpiles, trenches, projections, and the like, with the intent of protecting the materials and construction from vandalism and to protect the public from injury and property damage.

4. The General Contractor shall provide all temporary lighting and power for the duration of the construction project. In addition to the above, provide and maintain, to the satisfaction of the local authorities having jurisdiction, all temporary lighting and power that may be required for safety purposes.

- H. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:

- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

- C. Storage and Staging: Use designated areas of Project site for storage and staging needs.

- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

- E. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal" and Division 01 Section "Sustainable Design Requirements".

- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section "Execution."

- G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

- H. Provide sufficient quantity of dumpsters at strategic locations within the Contract limit lines for collection of waste from the work of all subcontractors on site.

1. Do not pass materials through open windows, or through window openings when any portion of the window remains in the opening.

- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

- J. Temporary Lifts and Hoists: The General Contractor shall provide, operate and maintain in safe operating order facilities for hoisting materials, rubbish, employees and to otherwise carry out the Work. The General Contractor shall only provide temporary hoists and lifts where the capacity of truck cranes and similar devices cannot be used due to height, weight, and/or lateral distance limitations of truck cranes and similar devices. Temporary hoists and lifts shall be limited to stationary tower cranes, stationary hoists, and steel track crawler cranes. Truck cranes, fork lifts, man lifts and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities. Truck cranes, fork lifts, man lifts, and similar devices required for the performance of Work by the General Contractor shall be provided by the General Contractor.
- K. Provide temporary lifts and hoists that comply in all respects with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances, and provisions of Division 01 of this Specification.
- L. Staging and Scaffolding: Where staging and scaffolding is required, the General Contractor shall provide the entire installation,
- M. Staging shall be of approved design, erected and removed by experienced stage builders and shall have all accident prevention devices required by State and local laws.
- N. Stairs, Ladders, Ramps, Platforms, Etc.: The General Contractor shall provide, operate and maintain in safe operating order all temporary stairs, ladders, platforms bridging and other temporary construction required for the proper execution of the Work.
- O. Provide temporary stairs, ladders, platforms bridging and other temporary construction that complies in all respects with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances, and provisions of Division 01 of this Specification.
- P. Coordinate erection, maintenance, and removal of all temporary stairs, ladders, platforms bridging and other temporary construction furnished by Subcontractors.
- Q. Provide temporary protective wood treads and handrails as soon as permanent stairs, ladders ramps, platforms, etc. are erected, before their use for construction purposes.
- R. Provide protective coverings, barriers, devices, signs, or other procedures to protect and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.
- S. Window Removal and Protection: Where necessary to deliver materials or remove materials or debris through windows or window openings, responsibility for all costs of removing windows completely from openings; reinstalling windows when such operations are complete; and for cleaning and repairing all damage resulting from such operations, is the General Contractor's.
 - 1. Do not pass materials through open windows, or through window openings when any portion of the window remains in the opening.
- T. The General Contractor shall completely remove and safely store windows and doors, including frames, pannings and all associated components, where used for delivery or removal of materials.

Protect sills, jambs and heads with substantial continuous wood and plywood wrap around guards so that no part of the window construction can be damaged by impact of materials.

- U. The General Contractor shall reinstall windows in the same manner as the original installation, properly shimmed and blocked at all anchorage locations, in conformance with the requirements of applicable Division 08 Sections.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- E. Temporary Enclosures: The General Contractor shall provide all temporary enclosures for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Install tarpaulins securely, with fire-retardant-treated wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
 - 2. Close openings through floor or roof decks and horizontal surfaces with loadbearing wood-framed construction.
 - 3. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fireretardant treated material for framing and main sheathing.
 - 4. Do not use new permanent doors and frames for temporary enclosures until finishing work is begun, and then only if carefully protected from damage. Prior to installation of permanent doors and frames, provide temporary wood or plywood doors with wood frames and proper hardware to make the doors self-closing.
 - a. Close and lock all openings accessible from ground level at end of each day's work to prevent entry of unauthorized persons.

- F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
- G. Protection: Protect the Work at all times from damages. Provide all pumps, equipment and enclosures to ensure this protection.
1. Remove all snow and ice as may be required for proper protection and prosecution of the work.
 2. Provide all shoring, bracing and sheeting as required for safety and for proper execution of work.
 3. Protect all work from damage during cold weather. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, cease work and so notify Architect. Repair and/or replacement of all work damaged from frost, freezing or any elements of the weather are the responsibility of the General Contractor.
 4. Should high wind warnings be issued by the U.S. Weather Advisory Bureau, take every precaution to minimize danger to persons, to the Work, and to adjacent properties, including, but not limited to, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding or other temporary work.
 5. Protect the building and the site from damage, loss or liability due to theft or vandalism when the work is not in progress at night, weekends, or holidays. Exercise precaution for the protection of persons and property at all times. Observe the provisions of applicable laws and construction codes. Take additional safety and health measures, or cause such measures to be taken as reasonably necessary. Maintain guards on machinery, equipment and other hazards as set forth in the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.
 7. Protect and preserve in operating conditions all utilities traversing the work area. Repair all damages to any utility due to work performed under this Contract, the satisfaction of the Architect at no additional cost to the Owner.
- H. Roof Protection: The General Contractor shall protect newly installed roof surfaces to prevent damage. Keep traffic on roofs to an absolute minimum, and permit traffic only as required to complete the Work under this Contract. Manage access for each phase of the work to minimize operations on previously installed roofing. Do not store roofing material on previously installed new roofing.
1. Repair or replace all roofing and substrates that are damaged by operations under this Contract by any means necessary, in accordance with the Specifications and the

requirement and the roofing system Manufacturer's recommendations to their original condition, to the satisfaction of the Architect, at no additional expense to the Owner.

- I. Protect all new finished surfaces against possible damage from operations under this Contract.
 - 1. Restore or replace all surfaces that are damaged by operations under this Contract to their original condition, to the satisfaction of the Architect, at no additional expense to the Owner.
 - 2. Do not load, or allow any part of the structure to be loaded, with a weight that will endanger its safety or the safety of personnel operating in or around the premises.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard and replace stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

3.7 SITE CLEANING AND MAINTENANCE

- A. Perform an inspection of the site, including areas outside of the Site boundaries, with the Owner's Representative present, prior to the start of any Work, to determine the existing conditions.
- B. The Contractor shall take all necessary precautions to prevent the spreading of dirt and dust throughout the area of the Work. During demolition and all other work, take to contain dust and other debris from the Work within the limits of the site under the Contractor's control. Promptly

clean up all dirt, dust and debris escaping from the work areas or dropped from vehicles traveling to and from the Work.

1. Equip all vehicles used for transportation to, and removal of material from the site with covers, maintained in good condition, adequate to contain dust and debris within lawful acceptable limits.
 2. Provide facilities for preventing the spread of objectionable matter outside the site areas through washing of vehicles and vehicle wheels; decontamination of vehicles transporting hazardous waste containing materials such as asbestos, lead, or other matter; and by all other means necessary.
- C. Prior to Substantial Completion, remove all spots, stains, dirt and dust from all surfaces, including areas within other buildings and any portion of property of others, which were the result of the work of this project, to the satisfaction of the Architect.
- D. Requirements for final cleaning are contained in Division 01 Section "Closeout Procedures."
- E. Repair any damage to the building, site, the property of others or the Owner's equipment caused by the Contractor or its Subcontractors, at no additional cost to the Owner.

3.8 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of the General Contractor with the exception of furniture and equipment provided for the Owner's field office, which are the property of the Owner. The Owner reserves the right to take possession of Project identification signs.
- E. As a condition of the Architect's certification of Substantial Completion, restore site areas of the site damaged by work under this Contract to their condition existing at the start of the work, unless otherwise directed by the Architect.

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

END OF SECTION 01 50 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 60 00 — PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractor and/or supplier providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Division 01 Division Section "Allowances" for products selected under an allowance.
 - 3. Division 01 Section "Alternates" for products selected under an alternate.
 - 4. Division 01 Section "Submittal Procedures" for submittal requirements and procedures.
 - 5. Division 01 Section "References" for applicable industry standards for products specified.
 - 6. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 7. Divisions 02 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

4. Unspecified Products: If an indicated product or item is not specified, the Contractor shall provide the quantity indicated in the Contract Documents. The product or item must be new, of average quality, and fit for the use for which it was intended. If a commercially available manufactured product is not available to fulfill these requirements, the Contractor shall provide a custom fabricated product or item at no additional cost to the Owner. Submit shop drawings in accordance with Division 01 Section "Submittal Procedures."
 - a. This does not apply to unspecified products or items that must be provided in accordance with the manufacturer's recommendation for a complete installation of a specified product or item. Such products or items shall be provided in accordance with the manufacturer's recommendation.
 5. Equal Product: Product that is demonstrated and approved through submittal process that (1) is at least equal in quality, durability, appearance, strength, and design; (2) will perform at least equally the function imposed by the general design for the specific work being contracted for or the material purchased; and (3) conforms substantially, even with deviations, to the detailed requirements for the item specified.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
- D. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

- E. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- F. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Division 01 Section "Submittal Procedures."

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Resolution of Compatibility Disputes between Multiple Contractors:
 - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 SUBSTITUTION REQUESTS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use facsimile of form provided at end of Section.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- B. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor [through Construction Manager] of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
1. Form of Acceptance: As specified in Division 01 Section "Submittal Procedures".
 2. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
- C. Storage:
 - 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store materials in a manner that will not endanger Project structure.
 - 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
 - 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 7. Protect stored products from damage and liquids from freezing.
 - 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Warranties which state requirements to "repair or replace" defective or failed products shall require the Contractor or manufacturer, as stated as the responsible party under the warranty, to bear all costs for labor and materials, including shipping and testing costs, to repair the product on the project site or to replace the product with new on the project site.
 - 1. Where the warranty requires that the manufacturer examine the condition to determine if the product is defective or has failed, the manufacturer or its representative shall perform this review on the project site and shall include all costs for this review, including travel, housing, and testing. If the product needs to be removed and sent to the manufacturer for review and testing, then all costs shall be borne by the manufacturer, including labor to remove and reinstall the product and shipping required.
 - 2. Final acceptance and approval of all repairs or replacements shall be at the sole discretion of the Architect.
- D. List of Warranties: Provide warranties for products and installations as specified.
- E. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

- a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience **[will]** **[will not]** be considered **[unless otherwise indicated]**.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
3. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- a. For approval of products by unnamed manufacturers, comply with requirements in Division 1 Section "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 1 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 1 sustainability requirements Section and individual Specification Sections.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Division 1 Section "Submittal Procedures."
 1. Form of Approval of Submittal: As specified in Division 1 Section "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- C. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SUBSTITUTION REQUEST
(After the Bidding Phase)

DATE: _____

Project: _____ Substitution Request Number: _____
From: _____
To: _____ Date: _____
KBA Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No. _____
Installer: _____ Address: _____ Phone: _____
History: ☐ New Product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old
Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data attached – REQUIRED BY ARCHITECT

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____
Proposed substitution affects other parts of Work: ☐ No ☐ Yes; Explain: _____

Savings to Owner for accepting substitution: _____ (\$ _____)

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐

SUBSTITUTION REQUEST
(After the Bidding Phase)

DATE: _____

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for addition costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all aspects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

ARCHITECTS'S REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 013300.
- ☐ Substitution approved ad noted - Make submittals in accordance with Specification Section 013300.
- ☐ Substitution rejected – Use specified materials.
- ☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ Architect ☐

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect, Project Manager promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect and Project Manager when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and

electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect, Project Manager, and Construction Manager.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 7'-6" in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

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

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 02 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 2. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Penetration of in-place construction with an edged tool or drill to facilitate the installation or performance of other Work, including the removal of debris.
- B. Coring: Penetration of in-place construction with a drill that is designed to make the penetration in a manner such that the core can be removed to facilitate the installation or performance of other Work, including the removal of debris.
- C. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.

4. Dates: Indicate when cutting and patching will be performed.
 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 6. Structural Elements: Prior to cutting or coring structural elements, submit the proposed location and elements to be cut or cored and provide reinforcement details for each structural element.
 - a. Provide evaluation, engineering calculations, and details showing integration of reinforcement with original structure prepared by a Structural Engineer licensed in the Commonwealth of Massachusetts.
 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive Architect's right to later require removal and replacement of unsatisfactory work.
- B. Delegated-Design Submittal: For reinforcement indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional structural engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional structural engineer.

1.6 QUALITY ASSURANCE

- A. Professional Structural Engineer Qualifications: A professional structural engineer who is legally qualified to practice in the Commonwealth of Massachusetts and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations that are similar to those indicated for this Project in material, design, and extent.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Structural elements include, but are not limited to the following:
1. Concrete foundation construction.
 2. Bearing and retaining walls.
 3. Lintels.
 4. Structural steel frame.
 5. Structural decking.
 6. Miscellaneous structural metals.
 7. Interior and/or exterior load bearing masonry wall construction.
 8. Roof planking.
 9. Sill plates.
 10. Stone lintels.

- C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-suppression systems.
 4. Mechanical systems piping and ducts.
 5. Control systems.
 6. Communication systems.
 7. Electrical wiring systems.
- D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Piping, ductwork, vessels, and equipment.
 4. Noise- and vibration-control elements and systems.
 5. Roofing systems.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting and Coring: Cut and core in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. Cutting and Coring Responsibility:
 - a. Cutting and coring openings less than 12" square or 12" in diameter in elevated concrete slabs in conjunction with the Work of each Subcontractor is the responsibility of the Subcontractor. All other cutting and coring of elevated slabs is the responsibility of the Contractor.

- b. Cutting openings less than 12" square or 12" in diameter in non-loadbearing partitions in conjunction with the Work of each Filed Subcontractor is the responsibility of the Filed Subcontractor. All other cutting of non-loadbearing partitions, including but not limited to masonry non-loadbearing partitions, is the responsibility of the Contractor.
 - c. Cutting concrete slab-on-grade for all Work, including but not limited to installation of utilities, is the responsibility of the Contractor.
 - d. Cutting and coring of all structural elements, including but not limited to beams, columns and loadbearing partitions, is the responsibility of the Contractor regardless of the size of the opening, with the exception of elevated concrete slabs as specifically noted herein.
 - 2. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 3. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 4. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 5. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 6. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 7. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
- 1. Patching Responsibility:
 - a. Patching in conjunction with each Filed Subcontractor's cutting and coring is the responsibility of each Filed Subcontractor. Patching in conjunction with the Contractor's cutting and coring is the responsibility of the Contractor, including but not limited to loadbearing and non-loadbearing masonry partitions.
 - b. If the size of a penetration is cut in excess of that required for the size of the penetrating duct, pipe or conduit, and exceeds the maximum 12-inch dimension for work of the Filed Subcontractor, patching is the responsibility of the Filed Subcontractor.
 - 1) Comply with requirements of Division 07 Section "Penetration Firestopping" for installation of firestopping and size of penetrations in conformance with UL requirements.
 - 2. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

3. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 4. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: The Contractor shall clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete masonry units (CMUs).
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry joint reinforcement.
 - 5. Miscellaneous masonry accessories.
 - 6. All hoisting and scaffolding for completion of masonry work.
 - 7. Masonry waste disposal.
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
- B. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
2. Control/Expansion Joints: Prior to installation, provide layout indicating recommended locations of all control/expansion joints in CMU walls and exterior masonry veneer. Provide details for all conditions.
 - a. Architect will make final determination for locations of all control/expansion joints.

C. Samples for Verification: For each type and color of the following:

1. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
 2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements in ACI 530.1.
- G. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot-weather requirements in ACI 530.1.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
1. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
 2. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.
- E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602/1.8C whenever the following conditions exist:

1. The ambient temperature falls below 40 deg F.
 2. The temperature of masonry units is below 40 deg F.
 3. Implement the following minimum procedures:
 - a. The temperature of masonry units shall not be less than 20 deg F when laid in the masonry. Remove visible ice on masonry units prior to installation.
 - b. Heat the mortar sand or mixing water to produce mortar temperatures between 40 deg F and 120 deg F at the time of mixing. Maintain mortar above 32 deg F until used in masonry.
 - c. Use heat sources where ambient temperatures are between 20 deg F and 25 deg F on both sides of the masonry under construction. Install wind breaks when wind velocity is in excess of 15 mph.
 - d. Where ambient temperature is below 20 deg F, provide an enclosure for the masonry under construction and use heat sources to maintain temperature above 32 deg F within the enclosure.
 - e. Where mean daily temperatures are between 32 deg F and 40 deg F, protect completed masonry from rain and snow by covering with a weather resistive membrane for 24 hours after construction.
 - f. Where mean daily temperatures are between 25 deg F and 32 deg F, completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
 - g. Where mean daily temperatures are between 20 deg F and 25 deg F, completely cover completed masonry with insulating blankets, or equal protection, for 24 hours after construction.
 - h. Where mean daily temperatures are below 20 deg F, maintain masonry temperature above 32 deg F for 24 hours after construction by enclosure with supplementary heat, by electric blankets, by infrared heat lamps, or other acceptable methods.
 4. Do not lay masonry units that are wet or frozen.
 5. Remove masonry damaged by freezing conditions.
 6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602/1.8D, whenever the ambient air temperature exceeds the following:
1. 100 deg F, or 90 deg F with a wind velocity greater than 8 mph.
 2. Implement hot weather protection in accordance with Article 2.1.2.1(d).
 3. Do not spread mortar beds more than 4 feet ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.2 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions where indicated.
2. Provide factory fabricated bullnose units for outside corners.

- B. Concrete Masonry Units: ASTM C 90.

1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. A. Jandris & Sons.
 - b. Hi-Way Concrete Products.
 - c. Nitterhouse Masonry Products, LLC.
2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
3. Weight Classification: Lightweight.
4. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
5. Exposed Faces: Manufacturer's standard color and texture.
6. Fire Rated Concrete Masonry: In accordance with test procedures set forth in ASTM E 199 or alternative methods as follows:
 - a. U.L. Design Assemblies: Provide a U.L. Certificate for design of composite wall assembly for each hourly rating required.
 - b. In accordance with the Massachusetts State Building Code:
 - 1) Fire-resistance designs documented in approved sources.
 - 2) Prescriptive designs of fire-resistant rated building elements as prescribed in Section 720.0.
 - 3) Calculations in accordance with Section 721.0.
 - 4) Engineering analysis based on a comparison of building element designs having fire resistance ratings as determined by test procedures set forth in ASTM E 119.

- c. Fire rated wall construction includes reinforcement, facing or finish materials, load bearing and non-load bearing walls; and requirements for members framed into walls.

2.3 MASONRY LINTELS

- A. General: Provide masonry lintels as indicated, complying with requirements below.
- B. Masonry Lintels: Built-in-place masonry lintels made from lintel and/or bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- D. Masonry Cement: The use of masonry cement is not permitted.
- E. Aggregate for Grout: ASTM C 404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. GCP Applied Technologies; Morset.
 - c. Sonneborn Products, BASF; Trimix-NCA.
- G. Water: Potable.

2.5 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Limit cementitious materials in mortar to portland cement and lime.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - B. Mortar Mixes: At Contractor's option, provide job-mixed mortar or preblended dry mortar mix. Provide colors required for each application indicated.
 - C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
 1. Product: Subject to compliance with requirements, provide the following:
 - a. Spec Mix; Portland Lime & Sand.
 - D. Mortar Types for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated:
 1. For reinforced masonry, use Type M or S.
 2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
 - E. Grout for Unit Masonry: Comply with ASTM C 476.
 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - a. Use fine grout for 6 inch thick concrete masonry wythes.
 - b. Use course grout for 8-inch thick or greater concrete masonry wythes.
 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.
- 2.6 REINFORCING STEEL
- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- 2.7 MASONRY JOINT REINFORCEMENT
- A. Masonry Joint Reinforcement, General: ASTM A 951.
 1. Interior Walls: Hot-dip galvanized, carbon steel.
 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter (9 gauge).
 4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter (9 gauge).

5. Wire Size for Veneer Ties: W2.8 or 0.188-inch diameter (3/16-inch).
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Heckmann Building Products; Ladder Type 1100.
 - b. Hohmann & Barnard, Inc.; #220 Ladder Mesh.
 - c. Wire-Bond; Series 200 Core Clear Ladder Type.

2.8 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

C. Postinstalled Anchors: Provide torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

1. Control Joints: Provide compressible filler, 3/8-inch thick and 3 inches wide.

a. Products: Subject to compliance with requirements, provide one of the following:

- 1) Heckmann Building Products; Neoprene Expansion Joints 354.
- 2) Hohmann & Barnard, Inc.; NS Closed Cell Neoprene Sponge.
- 3) Wire-Bond; #3300 Expansion Joint.

B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Blok-Lok; VS Series PVC Control Joint.
 - b. Hohmann & Barnard, Inc.; #VS Series – PVC Control Joint.
 - c. Wire-Bond; PVC Control Joint.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Grout Screen: Fabricated from monofilament polypropylene mesh to prevent grout falling through; without interfering with mortar bond.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Advanced Building Products Inc.; Grout Catch.
 - b. Heckman Building Products, Inc.; Grout Stop.
 - c. Hohmann & Barnard, Inc.; MGS.
 - d. Wire-Bond; Grout Stop 3612.
- E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.148-inch (9 gauge) steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
 - b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
 - c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem.
 - c. PROSOCO.
- B. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in the following bond pattern(s); do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 1. Running bond.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, and remove loose masonry units and mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill all cores in hollow concrete masonry units with grout.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof deck above, unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay concrete masonry units as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
 - 1. Strike mortar joints flush where providing substrate for fluid applied air and vapor barrier at interior cavity wall masonry wythes.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
 - a. Reinforcement above is in addition to continuous reinforcement.

- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
 - 1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install control joints in interior concrete masonry partitions where indicated, and as follows. During wall layout, verify locations of all control joints with Architect.
 - a. Spacing of control joints in straight walls not to exceed 20 feet horizontally.
 - b. Install control joints at intersections of walls and column enclosures.

3.8 LINTELS

- A. Install steel lintels at openings where indicated.
- B. Provide masonry lintels at openings in interior or exterior CMU partitions without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace,

- tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Do not exceed the following pour heights for fine grout.
 - a. For minimum widths of grout spaces of 3/4 inch or for minimum grout space of hollow unit cells of 1-1/2 by 2", pour height of 12".
 - b. For minimum widths of grout spaces of 2" or for minimum grout space of hollow unit cells of 2 by 3", pour height of 60".
 - c. For minimum widths of grout spaces of 2-1/2" or for minimum grout space of hollow unit cells of 2-1/2 by 3", pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3" or for minimum grout space of hollow unit cells of 3 by 3" pour height of 24 feet.
 2. Do not exceed the following pour heights for coarse grout:
 - a. For minimum widths of grout spaces of 1-1/2" or for minimum grout space of hollow unit cells of 1-1/2 by 3", pour height of 12 inches.
 - b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3", pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2" or for minimum grout space of hollow unit cells of 3 by 3", pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3" or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.
 3. Provide cleanout holes at least 3" in least dimension for grout pours over 60 inches in height.
 - a. Provide cleanout holes at each vertical reinforcing bar.
 - b. At solid grouted masonry, provide cleanout holes at not more than 32 inches o.c.
- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to

perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- B. Inspections: Special inspections according to the Massachusetts State Building Code.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- C. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
 - 1. Payment for these services will be made by Owner.
 - 2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for compressive strength.
- F. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.

4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
 1. Disposal: Separate, salvage, recycle and dispose of materials in accordance with the Commonwealth of Massachusetts "Waste Ban" 310 CMR 19.017.

END OF SECTION 04 20 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

This Section includes all labor, material, and other services, to complete the fabrication and installation of the Structural Steel and related items as shown on the drawings. The work includes, but is not necessarily limited to, the following:

- A. Furnishing, fabrication, and erection of all structural steel beams and girders, braced and moment- resistant frames, permanent diagonal bracing, posts and columns, and frames for openings, including all bolts and welding as required for the complete installation of the work.
- B. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."
- C. Furnishing all anchor bolts for building under other sections, and leveling plates to be set and grouted under other sections.
- D. Shop painting and field touch-up of all steel, except anchor bolts and steel to be wholly encased in concrete, or to receive sprayed-on fireproofing.
- E. Erection drawings and shop details and connection designs.
- F. Providing all tools, equipment and temporary bracing required for safe, proper and expeditious erection of the work.
- G. Furnishing of all loose steel lintels indicated on the Structural Drawings (if any), erection of all such loose lintels weighing more than 200 lbs., and furnishing and erection of all attached lintels.
- H. Welding of masonry accessories (channel slots, etc.) furnished under Division 4 Section "UNIT MASONRY" to structural steel.
- I. Galvanizing of all structural plates and shapes directly supporting or in contact with exterior brick or block masonry and elsewhere as indicated on the drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. DIVISION 1 Section "Cutting and Patching"
- B. DIVISION 7 Section "Penetration Firestopping"
- C. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.3 QUALITY ASSURANCE

- A. All structural steel work shall comply with the Specifications for the "Specifications for Structural Steel Buildings" (dated June 11, 1989) issued by the American Institute of Steel Construction, and shall comply with the requirements of local building codes.
- B. All welding shall be done by the electric arc process and conform to Code of Arc and Gas Welding in Building Construction of the American Welding Society. All welding shall be performed by operators qualified in accordance with this Code.

1.4 SPECIAL QUALIFICATION REQUIREMENTS

A. Steel Fabricator

- 1. At the time of the bidding, the Fabricator shall be certified by the AISC Certification Program as "STD" (Standard for Steel Building Structures) and, in addition, shall have a minimum of five years' satisfactory experience in the type of work shown on the drawings. A list of fabrication work performed by the fabricator shall be submitted for review by the Architect

B. Welding

- 1. Qualify welding process and welding operators in accordance with AWS "Standard Qualification Procedure.
- 2. Provide certification that welders to be employed by the fabricator and the erector to perform welding for this Project have satisfactorily passed AWS qualification tests.
- 3. If re-certification of welders is required, re-testing will be Contractor's responsibility.

1.5 SUBMITTALS

A. Shop Drawings

- 1. Detailed shop drawings shall be furnished for review, showing setting locations, and connections for structural steel work.
- 2. Manufacturing or fabricating of any material or performing of any work prior to the review of shop drawings will be entirely at the risk of the Contractor.
- 3. The Contractor shall submit designs and details for all shop and field connections of all fabricated members, including, but not limited to, beam and girders, hangers, etc. The review of design, detail and erection shop drawings by the Structural Engineer of Record will be for size and arrangement of principal and auxiliary members and will not relieve the Engineer for Connections of responsibility for the design of the connections. Any moment frame or brace frame connection must be stamped, signed and designed by a licensed professional engineer in the State of Connecticut. The standard beam connection shop connections must also be submitted and stamped and signed by a licensed professional engineer in the State of Massachusetts who has a minimum of 1,000,000 dollars of professional liability

- insurance.
4. Any errors in dimensions shown on shop drawings shall be the responsibility of the Contractor.
 5. Where the required data for attaching materials to the structural steel is not shown on design drawings, the Contractor shall obtain information before submitting shop drawings.
 6. The drawings shall include job standards for shop and field connections, anchor bolts and base plate plans, erection drawings for floor and roof framing, beam and column indexes, and detail drawings of structural members.
 7. Erection drawings shall incorporate column numbering and location systems exactly as given on structural plans, as well as the vertical dimensioning datum. Plans shall be drawn at the same scale (or exactly twice the scale) as the Contract Document plans, and in exactly the same orientation and scope of each sheet.
 8. The shop drawings shall be submitted in the following order.
 - a. Connection designers qualifications
 - b. Standard shop standards i.e. standard shear tab connections
 - c. Anchor rod column grid placement drawings.
 - d. Erections drawings.
 - e. Simple shear connection design, this could be included in the shop standards.
 - f. Lateral member connection design i.e. moment connections, brace connections.
 - g. Piece drawings.

Special Note: If the lateral member connection designs are not yet submitted at the time of piece drawing submission the lateral members, i.e. beams and columns should not be submitted. Lateral members shall only be submitted after the connection designs have been reviewed.

9. Erection drawings showing sizes, weights and locations of all structural members shall also be included in an early submission. These erection drawings shall include large scale sections through all spandrel conditions to indicate suspended lintels and braces, including adjustment and field welding, if any; location of masonry anchors, field welds, etc.

B. Product Data

1. Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show completeness with specifications (include specified Standards)
 - a. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 - b. High strength bolts (each type), including nuts and washers.
 - c. Structural steel primer.

1.6 PRODUCT HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place

concrete or masonry.

- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms or other supports. Protect steel members and packaged materials from erosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members of supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All anchor bolts shall be ASTM F1554, Grade 55 unless otherwise noted in the Contract Documents.
- B. Angles, channels and plates shall conform to ASTM A36. Steel shall be new, clean and straight.
- C. All other structural steel work shall conform to ASTM A992 with special requirements per AISC Technical Bulletin #3, dated March 1997). Steel shall be new, clean and straight.
- D. Hollow steel tubular columns shall conform to ASTM A500 Grade B.
- E. High strength bolts shall conform to ASTM A325. (Load indicator bolts may be used to provide tension control.) All A490 bolts shall be a minimum 7/8" diameter.
- F. Arc welding electrodes shall conform to ASTM Standard Specification A233, latest edition. Electrodes shall be of proper classification numbers.
- G. Load Indicator Washers if used for tension control - conform with the requirements of the "Specification for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints, June 23, 2000.
- H. Shop paint for all steel shall be fabricator's standard primer. It shall be compatible with all finish coatings including intumescent paints.
- I. Paint system for the carport/canopy alternate to be applied to the column shafts only to be the following system by **Tnemec Company**:

Surface Preparation: SSPC-SP6 Commercial Blast
Coat 1: Tnemec Series 94 HydroZinc at 2.5-3.5 mils DFT (shop applied)
Coat 2: Tnemec Series L69 Epoxoline at 4-6 mils DFT
Coat 3: Tnemec Series 750 UVX at 2-3 mils DFT

- J. Galvanizing shall be hot-dip galvanizing conforming to ASTM A-386.

2.2 FIELD COORDINATION

- A. All measurements shall be verified in the field, particularly for work installed before delivery of steel.
- B. The Contractor shall check all drawings and shall be responsible for completeness and correct fittings of all work.
- C. All anchor bolts and plates required to be set in concrete or masonry shall be furnished and delivered, together with templates and/or instructions for setting, in ample time for installation by other

2.3 FABRICATION

- A. Finished members shall be true to line and free from twists, bends, and open joints between component parts. If straightening or flattening is required, it shall be done in a manner that will not injure the material.
- B. Holes for bolts shall be drilled or punched 1/16" larger than the nominal diameter of the bolts. Burning to enlarge unfair holes is not permitted. Holes that must be enlarged shall be reamed. Bolts shall fit holes snugly and shall be drawn up tight and shall have full grip on bolts.
- C. Provision for work by other trades:
 - 1. Open holes shall be provided for attachment of windows, nailers, hangers, plates, pipes, etc., and for attaching of work by other trades which adjoin, attach to, or connect with Structural Steel.
 - 2. Particular notice shall be given to requirements where miscellaneous metal adjoins Structural Work.
- D. Wherever welding is employed, either in fabrication or erection, all such work shall be done in complete accordance with Specifications of the American Welding Society.
- E. All welding, both shop and field, shall be performed only by certified welders. Qualification shall be on the basis of tests as set up by American Welding Society for structural work. Copies of qualification of welders shall be submitted to Architect before commencing any welding. Shop and field welds shall be subject to approval by Architect or Engineer.
- F. Fillet welds shall be 3/16" minimum unless otherwise indicated or if smaller welds are required to suit thin members. Groove welds shall be full penetration type.
- G. Where masonry anchors are indicated on the Contract Documents, channel slots furnished to this Subcontractor by the "Unit Masonry" Subcontractor shall be welded to steel beams, girders and columns. The anchors shall be spaced 16" on center horizontally for beams and girders and to steel columns at 16" on centers vertically, unless otherwise shown.

2.4 CONNECTIONS

- A. All shop connections shall be welded unless otherwise shown on plans.
- B. Field connections shall be welded where specifically shown. All other field connections shall be bolted with 3/4" minimum ASTM A325 high strength bolts. All connections shall be installed using tension control by means of load indicator washers or load indicator bolts.
- C. Where bolted connections are used, they shall have the minimum number of bolts as shown on the drawings, but shall have a strength at least equal to the beam reactions given on the drawings, or as given in notes on the drawings.
- D. Bolted connections carrying calculated stresses shall have a minimum of two bolts, except that diagonal seismic braces shall have a minimum of four bolts.
- E. Where seismic moment-resisting frames occur, beams and girders shall have moment connections to the columns, using either bolted or welded connections, having the moment value as shown on the Drawings. (Where no value is shown, the connection shall be capable of resisting the moment capacity of the members themselves.)

2.5 PAINTING

- A. Painting not required where steel beams are either encased with concrete or beams that are scheduled to receive spray fireproofing.
- B. All steel shall be cleaned by Power Tool Cleaning (SSP-SP3). Surfaces of structural steel to be permanently exposed shall be free of loose scale, rust, slag, and flux deposit; oil and grease; and dirt and other matter before applying primer

2.6 INSPECTION AND TESTING DURING FABRICATION

- A. All work included in this Section of the Specification may be inspected for compliance with the Specifications and conformity with the shop drawings approved by the Architect, by an independent testing laboratory selected and paid by the Owner.

PART 3 - EXECUTION

3.1 ERECTION

- A. Assembly, installation and the erection of structural steel shall be under the control of and shall be the responsibility of the structural steel fabricator.
- B. Erector shall provide temporary bracing adequate to resist all erection loads with no overstressing of temporary and permanent steel. Such bracing shall be left in place as long as required to ensure safety of structure.
- C. Welding and bolting of all connections shall follow the setting of the steel as closely as

plumbing and alignment will permit.

- D. Any variation from the work, as shown on the drawings, which may occur during erection, shall be reported to the Architect for adjustment and no work affected by such variation shall be continued until the Architect has rendered a decision.
- E. Utmost care shall be taken in erecting steel to avoid endangering the structure, construction personnel, or other personnel of the Owner or Architect, or personnel having legitimate business on the site. Location of supports for derricks, hoists, rigging, or materials, shall be carefully studied by the Contractor, who shall remain wholly responsible for the safety and integrity of such supports.
- F. Flame cutting of structural steel in the field, by any Contractor will not be allowed except with the written permission of the Architect.

3.3 LINTELS

- A. Lintels called out on the structural drawings shall be furnished and installed under this Section.
- B. Loose lintels furnished as noted above will be installed under Masonry Division, except individual lintels weighing over 200 lbs. each which shall be installed under this Section.
- C. See structural framing plans and structural details on Structural Drawings for sizes and details of lintels. Lintels shall have a minimum 5" bearing on masonry unless otherwise noted.

3.4 INSPECTION AND TESTS

- A. All work included in this Section of the Specification may be inspected for compliance with the Specifications and conformity with the shop drawings approved by the Architect, by an independent testing laboratory selected and paid by the Owner.
- B. The inspection agency may inspect all work executed in the field for compliance with the Specifications, and no subsequent work shall be installed unless previously erected work has been approved and all deficiencies corrected.
- C. Field welding will generally be subject to visual inspection with the exception of full penetration welded connections. If, in the opinion of the inspection agency, any doubt exists as to the adequacy of any weld, this agency will perform non-destructive examinations. Any welds found faulty shall be cut out and corrected to the satisfaction of the inspecting agency. All full penetration welds shall be ultrasonically tested unless otherwise directed by the Structural Engineer of Record.
- D. Field inspection of high tensile bolts will be performed by the testing agency. Inspection will be visual only, with the inspector satisfying himself that the tension control devices indicate that the bolts have been satisfactorily installed.
- E. The Contractor shall cooperate with the inspection agency, provide the necessary ladders,

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

scaffolds, platforms, etc., and incidental labor necessary for the inspection agency to inspect the work and to make any non-destructive examinations, if required.

END OF SECTION 05 12 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking
 - 2. Wood blocking, nailers, and plywood sheathing associated with membrane roofing.
- B. Related Sections include the following:
 - 1. Division 07 Section "Thermoplastic Membrane Roofing."

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NHLA: National Hardwood Lumber Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. WCLIB: West Coast Lumber Inspection Bureau.
 - 4. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: 19 percent.
- C. Plywood: DOC PS 1.
 - 1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
 - 2. Factory mark panels to indicate compliance with applicable standard.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic, chromium or chromated copper arsenate (CCA).
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat miscellaneous carpentry, including the following:
 - 1. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
 - 2. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 3. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.
- E. Manufacturers: Subject to compliance with requirements, provide products by one the following:
 - 1. Georgia Pacific.
 - 2. Hoover Treated Wood Products, Inc.
 - 3. Koppers Performance Chemicals.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Application: Treat the following:
 - 1. Plywood backing panels.
- F. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dricon.
 - 2. Hoover Treated Wood Products.
 - 3. Koppers Performance Chemicals.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 lumber with 15 percent maximum moisture content and the following species:
 - 1. Hem-fir (north); NLGA.
- C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

- E. For furring strips for installing plywood paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Telephone, Data/Comm, and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, fire retardant treated, or in area of high relative humidity, provide fasteners of with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Do not splice structural members between supports, unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- E. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
- F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 1. Table 2305.2, "Fastening Schedule," in the Massachusetts State Building Code.
- H. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

- B. Furring to Receive Plywood: Install 1-by-3-inch nominal- size furring vertically 24 inches o.c.

3.4 FIRE-RETARDANT-TREATED (FRT) MATERIALS INSTALLATION

- A. Cutting to length, drilling holes, joining cuts and light sanding are permissible. It is not necessary to field treat cut ends to maintain flame spread rating.
 - 1. Ripping, milling, and surfacing of FRT lumber is not permitted.
 - 2. FRT plywood can be cut in either direction without loss of fire protection.

3.5 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes the following:

1. Mechanically fastened membrane roofing system.
2. Roof insulation, tapered insulation and crickets.
3. Vapor retarders.
4. Cover board.
5. Flashing for roof drains, vent piping, and all roof penetrations.
6. All hoisting and scaffolding necessary of the completion of the roofing installation.
7. Waste disposal.

- B. Related Sections include the following:

1. Division 02 Section "Selective Demolition."
2. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 07 Section "Sheet Metal Flashing and Trim" metal roof penetration flashings, flashings, and counterflashings.
4. Division 07 Section "Joint Sealants."
5. Division 23 Sections for installation of mechanical equipment.
6. Division 26 Sections for electrical.

- C. The following Sections also include work to be incorporated in the Roofing and Flashing Filed Sub Bid:

1. Division 06 Section "Miscellaneous Rough Carpentry" for partial work of this Section.
2. Division 07 Section "Sheet Metal Flashings and Trim."
3. Division 07 Section "Roof Accessories."

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include project specific plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation layout, including slopes.
 - 3. ASCE 7 uplift zones and insulation fastening patterns.
 - 4. Expansion joints.
- C. Samples for Verification: For the following products:
 - 1. 6-by-6-inch square of sheet roofing, of color specified, including T-shaped side and end lap seam.
 - 2. 6-by-6-inch square of roof insulation.
 - 3. 6-inch length of metal termination bars.
 - 4. Six insulation fasteners of each type, length, and finish.
 - 5. Six roof cover fasteners of each type, length, and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system. Certification is required to be issued by manufacturer not less than one year prior to start of work.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of meeting performance requirements.
 - 2. Submit certificate of roof membrane sheet thickness specified, signed by manufacturer's control manager. ASTM +/- tolerance for membrane thickness is not acceptable.
- C. Qualification Data: For Installer and manufacturer.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
- E. Research/Evaluation Reports: For components of membrane roofing system.
- F. Maintenance Data: For roofing system to include in maintenance manuals.
- G. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.
- H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that has a UL Listing and FMG approval for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
 - 1. The Installer shall be doing business under the same name for a minimum of 5 years prior to January 1, 2024 and have applied similar roofing systems on 10 or more projects which have been completed for more than two years.
 - a. Furnish names and addresses of each project within 100 miles of Project.
 - 2. The Contractor that receives the award of this Project shall be the Installer of the roofing system. Installation of the roofing system shall not be subcontracted.
- C. Installer's Field Supervision: Maintain a full-time supervisor/foreman on-site during times that the roofing installation is in progress, who is experienced in installing roofing systems similar to type and scope required for this Project, and who is certified by the manufacturer as an approved applicator of the roofing system.
- D. Technical Field Monitor: Arrange with the manufacturer's roofing consultant to provide the services of an on-site, technical field monitor to periodically observe the total roofing system installation, and to provide the following:
 - 1. Confirm that the Roofing Contractor's applicators have completed the membrane manufacturer's training program.
 - 2. Monitor quality control over the total roofing operation, including but not limited to, wood blocking installation, roofing installation, metal work, flashing, and manufacturer supplied roofing system components and accessories required for the complete installation of the roofing system.
 - a. Confirm that all work is in compliance with the Contract Documents and installed as required to obtain warranty.
 - 3. Monitor the quality of the hot air welded seams by taking a minimum of three cross seam cuts, measuring 2 by 6 inches at each periodic observation. Patch test cuts with same material at no additional cost to Owner.
 - a. Include field samples with reports.
 - 4. Inspect roof installation bi-monthly and prepare punchlist for corrective action by the Installer.
 - 5. Provide a written report to the Architect and Installer.

- E. Source Limitations: Obtain components for membrane roofing system from or approved by roofing membrane manufacturer.
- F. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- G. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
 - 1. Store membrane rolls horizontally on pallets, fully protected from the weather with canvas tarpaulins. Non-vented, polyethylene tarpaulins are not permitted.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

- A. Temporary Support Facilities: Furnish and install all temporary lifts, hoists, staging, scaffolding, rigging, labor and materials, and temporary support to perform all operations in connection with the installation of this Work. Remove all temporary support facilities when no longer required.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
 - 1. Do not leave weather sensitive materials (i.e. insulation) exposed overnight. Only install what can be covered and made weathertight by the end of each day.
- C. Substrate Conditions: Proceed with roofing installation after substrates have been inspected and determined to be in satisfactory condition. Commencement of work indicates acceptance of substrates.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's customized form, without monetary limitation, edge-to-edge, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, vapor retarder, walkway products, and other components of membrane roofing system.
 - 2. Wind Speed Warranty: Special warranty includes peak gust wind speed up to 72 mph.
 - 3. Manufacturer shall certify the application methods and performance of the roofing system as part of the warranty.
 - 4. Warranty Period: 30 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, vapor retarders, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7 and the Massachusetts State Building Code.
 - 1. Basic Wind Speed: 127 mph.
 - 2. Exposure Category: Exposure B.
 - 3. Risk Category: IV.

2.2 PVC ROOFING MEMBRANE

- A. PVC Sheet: ASTM D 4434, Type II, Grade I, glass fiber reinforced.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide **Sika Sarnafil, Inc.; G410** or comparable product by one of the following:
 - a. Carlisle SynTec; Sure-Flex PVC.
 - b. Duro-Last Roofing Inc.; Duro-Tuff.
 - c. Johns Manville.
 - 2. Membrane Thickness: 80 mils nominal.
 - 3. Exposed Face Color: EnergySmart Reflective Grey.

2.3 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
- C. Flashing Membrane: Manufacturer's 60 mil thickness fiberglass reinforced, asphalt compatible, membrane used where asphalt contamination is anticipated, or when adhering to smooth asphalt flashings.
- D. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
- E. Fasteners: Factory-coated steel fasteners and metal plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
 - 1. Provide fasteners in lengths sufficient for a minimum embedment of 1-1/4".
 - a. Fasteners for attachment of metal to wood blocking: Annular ring nails.
 - b. Fasteners for attachment of metal to masonry: Expansion type.
- F. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarder: ASTM D 4397, 10 mils thick, minimum, with maximum permeance rating of 0.1 perm.
 - 1. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Self-Adhering Vapor Retarder: Self-adhesive vapor barrier composed of SBS modified bitumen with a top surface of high-density polyethylene grid laminated between two layers of polyethylene film, and a silicone release plastic film that covers the self-adhesive back side.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle; VapAir Seal 725TR.
 - b. Duro-Last; Duro-Last Vapor Barrier.

- c. Johns Manville; Vapor Barrier SA.
- d. Sika Sarnafil; Sarnavap SA.

2.5 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 - 1. To maintain system warranty, manufacturer's approved insulation must be installed.
 - 2. R-Value: 5.7 per inch.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4-inch per 12 inches as indicated.
 - 1. Thickness: As indicated on Drawings.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
- D. High Density Cover Board: ASTM C 1289, Type II, Class 4, high density, fiberglass coated, closed-cell polyisocyanurate foam insulation.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle SynTec Incorporated; SecurShield HD Plus.
 - b. Duro-Last; Duro-Guard Dexcell FA Glass Mat Roof Board.
 - c. Johns Manville; ProtectoR HD.
 - d. Sika Sarnafil; Sarnatherm Roof Board H.
 - 2. Compression Strength: ASTM D 1621, 109 psi (100 psi minimum).
 - 3. Thickness: 1/2-inch.

2.7 NAILERS, BLOCKING AND PLYWOOD

- A. Furnish and install all wood blocking and plywood sheathing at parapets, associated with membrane roofing, to comply with Division 06 Section "Miscellaneous Rough Carpentry."

2.8 INDUCTION FASTENING SYSTEM

- A. Induction Fastening System:

1. Non-membrane penetrating fastening system for installing roof insulation and thermoplastic membrane roofing.
2. Fastening system uses same plates and fasteners to secure roof insulation and membrane roofing to roof deck or purlins without penetrating roof materials.
3. Electromagnetic induction welding process bonds underside of membrane roofing to top of coated plates.

- B. Fasteners: OMG Roofing Products "XHD Fasteners #15":

1. Secures roof materials to 22-gauge minimum steel deck.
2. Head:
 - a. #3 Phillips truss head.
 - b. Diameter: 0.435 inch.
3. Thread Diameter: 0.275 inch.
4. Shank Diameter: 0.202 inch.
5. Length: Sufficient length to penetrate steel deck at top flute a minimum of 1 inch.
6. Drill point.
7. Heat treated.
8. Coating: OMG Roofing Products "CR-10" corrosion-resistant coating.
9. Coating Corrosion Resistance: Meets FM Approval Standard 4470 criteria.
10. FM approved.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 05 Section "Steel Decking."

4. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
5. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
6. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F 2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with no fewer than three test probes.
 - b. Submit test reports within 24 hours of performing tests.
7. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.
8. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
 1. Do not permit waterstops to remain in contact with permanent roofing as the installation progresses.
 2. Do not permit incompatible materials, including asphalt, coat tar, heavy oils, and roofing cements to come in contact with roofing membrane. If contact occurs, remove contaminated membrane and replace at no additional cost to the Owner.

3.3 TEMPORARY CUT-OFF

- A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100 percent watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. Waterstop shall be sealed to the deck or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as specified. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, and insulation fillers shall be removed

from the work area and properly disposed of offsite. None of these materials shall be used in the new work.

- B. If inclement weather occurs while a temporary waterstop is in place, the Contractor shall provide the labor necessary to monitor the situation to maintain a watertight condition.
- C. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Contractor's expense.

3.4 FASTENER PULL-OUT TESTING

- A. Retain independent testing and inspecting agency to conduct fastener pull-out tests according to SPRI FX-1, and submit test report to Architect and roofing membrane manufacturer before installing new membrane roofing system.
 - 1. Obtain roofing membrane manufacturer's approval to proceed with specified fastening pattern. Roofing membrane manufacturer may furnish revised fastening pattern commensurate with pull-out test results.

3.5 VAPOR-RETARDER INSTALLATION

- A. Coordinate installation and transition of roofing system component serving as a vapor barrier with sheet air and vapor barrier specified under Division 07 Section "Fluid-Applied Membrane Air Barriers."
- B. Self-Adhering Vapor Retarder:
 - 1. Substrate must be clean, dry and free of dust, grease or other contaminants; smooth and free of voids. Apply primer to clean and dry surfaces with a brush, roller or sprayer at application rate recommended by manufacturer and as required for substrate. Allow primer to dry completely prior to installation of vapor barrier. Install vapor barrier on the same day as primer.
 - 2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 3 inches and 6 inches, respectively. Stagger end laps a minimum of 12 inches. Bond vapor retarder to substrate as follows:
 - a. Unroll sheet onto substrate without adhering for alignment. Do not immediately remove the silicone release sheet.
 - b. Once aligned, peel back a portion of the silicone release sheet and press membrane onto the substrate for initial adherence. Hold sheet tight and peel back release sheet by pulling diagonally.
 - c. Use a 75 lb. roller to press sheet down onto the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut membrane to remove air bubbles trapped under laps. Squeeze air bubbles by pushing the roller to the edge of the laps.

3. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system. Avoid tenting or wrinkles in the vapor retarder. If tenting or wrinkles occur, cut out imperfection and apply patch over area in accordance with manufacturer's instructions.

3.6 WOOD NAILER AND BLOCKING INSTALLATION

- A. Install continuous wood nailers at perimeter of the entire roof, around roof projections, penetrations, and locations indicated.
 1. Do not use nailers less than three feet in length.
 2. Build up nailer height to match thickness of substrate or insulation, with smooth transitions.
 - a. Wood blocking and nailers are indicated in nominal lumber sizes. Where required, as indicated or not, provide ripped, continuous shims to create nailer height to match thickness of substrate or insulation.
- B. Anchor nailers to resist a minimum force of 300 lbf in any direction. Provide a 1-1/2" space between lengths of nailers.
 1. Anchor nailers with fasteners spaced at 12 inches on center, staggered 1/3 the nailer width and installed within 6 inches of each end.
 2. Comply with fastening requirements of FM Loss Prevention Data Sheet 1-49.

3.7 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 1. Slope insulation and membrane at drains to create a 4' x 4' sump.
 2. End top edge of flashing just below the top edge of the sump to prevent any blockage for positive water flow.

- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification, but not less than one fastener for each 4 sq. ft. and at least two fasteners per board.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- H. Adhered Insulation (Non-Nailable Concrete Deck):
 - 1. Adhere insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Install all layers of insulation, flat and tapered, adhered to substrate with low-rise insulation adhesive in accordance with manufacturer's instructions.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Tightly butt cover boards together.
 - 1. Mechanically fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.8 INSTALLATION OF MECHANICALLY FASTENED ROOFING

- A. Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Plate Installation:
 - 1. Place plates in grid pattern on roof insulation in accordance with thermoplastic membrane roofing section.
 - 2. Install required number of plates and fasteners per 4-foot by 8-foot insulation/cover board or over purlins to achieve membrane roofing manufacturer's required FM rating and design uplift pressures as indicated on Drawings.
 - 3. Install plates in straight rows in at least 1 direction in accordance with membrane roofing manufacturer's prescriptive fastening patterns for roof field, perimeter, and corners. Plates may need to be adjusted slightly in order to hit top flutes of roof deck.
 - 4. Secure plates in accordance with membrane roofing manufacturer's instructions using specified fasteners and in accordance to roofing manufacturer's prescriptive fastening patterns for roof field, perimeter, and corners, and as required for specified FM rating.
 - 5. Do not overdrive fasteners on plates.

6. Install plates and fasteners tight and flat to roof insulation with no dimpling of insulation board, or cover board surface.
- C. Unroll roof membrane and allow to relax before installing.
- D. Lay membrane roofing over roof insulation and fastened plates in accordance with thermoplastic membrane roofing section.
- E. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.
- F. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- G. Overlap adjoining sheets of membrane roofing and join together by heat welding in accordance with thermoplastic membrane roofing section.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and flashing sheet.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- K. Calibration of Induction Welding Tools:
 1. Calibrate each induction welding tool in accordance with membrane roofing manufacturer's instructions to appropriate level for site conditions.
 2. Adjust induction welding tools to achieve maximum bond strength based on ambient temperature from 0 to 120 degrees F.
 3. Recalibrate induction welding tools whenever ambient temperature changes up or down by 15 degrees F.
 4. Adjust energy level of induction welding tools in accordance with membrane roofing manufacturer's instructions to produce optimal bond.
 5. Optimal Bond: 100 percent bond.
- L. Induction Weld Attachment of Membrane Roofing:
 1. Operate calibrated induction welding tools and magnetic cooling clamps in accordance with membrane roofing manufacturer's instructions. Keep bottom of magnetic cooling clamps clean from debris with a clean cotton rag.

2. Ensure induction welding tools are centered over plates.
3. Create 100 percent bond between underside of membrane roofing and top of plates.
4. Ensure total, even, consistent adhesion of membrane roofing to top of plates.
5. Partial Bond of Membrane Roofing to Plates: Not acceptable.

3.9 ROOF DRAIN INSTALLATION

- A. General: Roof drains must be flashed the same day as work is done in the area. Temporary drain inserts (copper stacks) or temporary flashing-in of the drains will not be allowed.
- B. Examine existing drain components and replace as necessary. If reusing existing clamping rings, clean body, ensure solid strainer and clamping ring. Tap bolt holes and replace bolts. Install new metal strainers.
- C. Ensure insulation is tapered to create a 4' x 4' sump.
- D. Prepare the substrate around the roof drain to prevent membrane bridging or distortion and to provide a smooth transition from the roof surface to the drain clamping ring. The mating surfaces between the field membrane and the drain base must be clean and have a smooth finish.
- E. Cut the membrane so that the hole is at least the size of the corresponding drain leader opening.
- F. The seal between the membrane and the drain base shall be provided by compression from the drain-clamping ring. Install manufacture's recommended sealant between clamping ring and membrane.
 1. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- G. Drains to be elevated to allow base layer of insulation to extend under the drain in order to comply with the Massachusetts Energy Code.

3.10 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with sheet flashing.
- D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.11 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.12 FIELD QUALITY CONTROL

- A. Engage a qualified testing agency to perform the following:
 - 1. Infrared thermal scan of completed membrane roofing system.
 - 2. Contractor to perform and restore test cuts in locations identified during scan to confirm presences of moisture within system.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect and Construction Manager.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
 - 1. Comply with Division 01 Section "Temporary Facilities and Controls."
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.14 WASTE DISPOSAL

- A. Unless otherwise indicated, excess materials are Contractor's property. At completion of roofing work, remove from Project site. Comply with Division 01 Section "Construction Waste Management and Disposal."
- B. Separate, salvage, recycle, and dispose of materials in accordance with Commonwealth of Massachusetts "Waste Ban" 310 CMR 19.017.

3.15 PROJECT COMPLETION

- A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of the manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and the manufacturer prior to demobilization.
- B. All Warranties referenced in this Section shall have been submitted and have been accepted at time of contract award.

END OF SECTION 07 54 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:
 - a. Penetrations in fire-resistance-rated walls.
 - b. Penetrations in horizontal assemblies.

B. Related Sections include the following:

1. Division 07 Section "Thermal Insulation" for fire safing insulation in non-fire rated horizontal floor/ceiling assemblies.
2. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction.
3. Division 21 Sections for responsibility of the Fire Protection Filed Subcontractor for firestopping.
4. Division 22 Sections for responsibility of the Plumbing Filed Subcontractor for firestopping.
5. Division 23 Sections for responsibility of the HVAC Filed Subcontractor for firestopping.
6. Division 26, 27 and 28 Sections for responsibility of the Electrical Filed Subcontractor for firestopping.

C. Work of this Section includes:

1. Fire Protection Filed Subcontractor: Penetrations of all fire barriers, smoke barriers, and fire resistant rated floor and roof assemblies for fire protection piping.
2. Plumbing Filed Subcontractor: Penetrations of all fire barriers, smoke barriers, and fire resistant rated floor and roof assemblies for plumbing and vent piping related to plumbing and natural gas systems.
3. HVAC Filed Subcontractor: Penetrations of all fire barriers, smoke barriers, and fire resistant rated floor and roof assemblies for piping and ductwork related to HVAC systems.
4. Electrical Filed Subcontractor and Sub-Subcontractors: Penetrations of all fire barriers, smoke barriers, and fire resistant rated floor and roof assemblies for electrical conduit, cables, and cable trays related to electrical, security and technology systems.

5. Contractor: Penetrations of all fire barriers, smoke barriers, and fire resistant rated floor and roof assemblies for all other Work.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
 1. Provide floor plans indicating location and type of firestopping system.
 2. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 3. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
 1. Types of penetrating items.
 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
 4. Engineering Judgments: For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests is to be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

- C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- D. Material Safety Data Sheets.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
 - 1. Engage an experienced firm who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products in accordance with specified requirements.
 - 2. Firm with not less than 3 years' experience with firestop installation.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
- C. Do not use products and materials that contain flammable solvents.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

- a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
- b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) FM Approval in its "Approval Guide."

2.2 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:
 1. Hilti, Inc.
 2. 3M; Fire Protection Products Division.
 3. Specified Technologies, Inc. (STI).
 4. Tremco; Tremstop Fire Protection Systems Group.

2.3 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.
- G. Labels: Self-adhering labels for identification of fire-resistive joint systems and fire resistant rated partitions identified in Part 3.
 - 1. Product: Subject to compliance with requirements, provide labels by one of the following:
 - a. Emedco (www.emedco.com).
 - b. Fire Wall Signs, Inc. (www.firewallsigns.com).
 - c. Seton (www.seton.com).

2.4 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials required in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial

extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.5 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems, and on both sides of partition, so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "WARNING - PENETRATION FIRESTOPPING SYSTEM - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.
- B. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
 - 1. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems with No Penetrating Items.
 - 1. Available UL-Classified Systems: C-AJ-001-0999.
- C. Firestop Systems for Metallic Pipes, Conduit or Tubing:
 - 1. Available UL-Classified Systems: C-AJ-1001-1999 and W-L-1001-1999.
- D. Firestop Systems for Nonmetallic Pipe, Conduit or Tubing:
 - 1. Available UL-Classified Systems: C-AJ-2001-2999 and W-L-2001-2999.
- E. Firestop Systems for Electrical Cables:
 - 1. Available UL-Classified Systems: C-AJ-3001-3999 and W-L-3001-3999.
- F. Firestop Systems for Cable Trays:
 - 1. Available UL-Classified Systems: C-AJ-4001-4999 and W-L-3001-3999.
- G. Firestop Systems for Insulated Pipes:
 - 1. Available UL-Classified Systems: C-AJ-5001-5999 and W-L-5001-5999.
- H. Firestop Systems for Miscellaneous Electrical Penetrants (Busducts):
 - 1. Available UL-Classified Systems: C-AJ-6001-6999 and W-L-6001-6999.

- I. Firestop Systems for Miscellaneous Mechanical Penetrants (Ductwork):
 - 1. Available UL-Classified Systems: C-AJ-7001-7999 and W-L-7001-7999.
- J. Firestop Systems for Groupings of Penetrants:
 - 1. Available UL-Classified Systems: C-AJ-8001-8999 and W-L-8001-8999.

END OF SECTION 07 84 13

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

- 1.1 GENERAL PROVISIONS – FILED SUB-BID REQUIRED AS PART OF 07 00 01 WATERPROOFING, DAMPPROOFING AND CAULKING FILED SUB BID
- A. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law Chapter 149, Sections 44A to 44J inclusive; and applicable Section of the MGL, Public Contract Law Chapter 30 as amended.
- 1.2 RELATED DOCUMENTS
- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”
- 1.3 SUMMARY
- A. Section Includes:
1. Silicone joint sealants.
 2. Urethane joint sealants.
 3. Latex joint sealants.
 4. Acoustical joint sealants.
 5. Acoustical spray sealants.
 6. All hoisting and scaffolding necessary for the completion of the Work.
- B. Related Sections include the following:
1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 2. Division 07 Section “Penetration Firestopping” for sealing through penetrations in fire-resistance rated construction.
 3. Division 07 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 4. Division 08 Section "Glazing" for glazing sealants.
 5. Division 09 Section "Tiling" for sealing tile joints.
- C. Related Sections for joint sealants furnished and installed by the Metal Windows Filed Sub Bid:
1. Division 08 Section “Aluminum-Framed Entrances and Storefronts.”

D. Related Section for joint sealants furnished and installed by the Acoustical Tile Filed Sub Bid:

1. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

E. Related Sections for joint sealants furnished and installed by the General Contractor:

1. Division 09 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

F. The following Sections also include work to be incorporated in the Waterproofing, Dampproofing, and Caulking Filed Sub Bid:

1. Division 07 Section "Water-Resistive Air-Barrier Membranes."
2. Division 07 Section "Modified Bituminous Sheet Air Barriers."

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Commissioning Agent.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

- 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 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.

1.6 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- B. Qualification Data: For Installer.

- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- D. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Warranties: Special warranties specified in this Section.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
 - 2. Each type of sealant and joint substrate indicated.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.9 PROJECT CONDITIONS

- A. Temporary Support Facilities: Furnish and install all temporary lifts, hoists, staging, scaffolding, rigging, labor and materials, and temporary support to perform all operations in connection with the installation of this Work. Remove all temporary support facilities when no longer required.
- B. 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.

1.10 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 for Urethane: Five years from date of Substantial Completion.
 - 2. Warranty Period for Silicone: 20 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Mildew Resistant, Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. Tremco; Tremsil 200 Sanitary.

2.3 URETHANE JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation-Construction Systems; MasterSeal NP 2.
 - b. Pecora Corporation; Dynatrol II.
 - c. Tremco; Dymeric 240 FC.

- B. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Corporation-Construction Systems; MasterSeal SL 2.
- b. Pecora Corporation; Dynatrol II-SG.
- c. Tremco; THC-900.

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. American Sealants, Inc.; ASI 174.
- b. Pecora Corporation; AC-20+.
- c. Sherwin Williams; PowerHouse Siliconized Acrylic Latex Sealant.
- d. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

- 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Green Glue; Green Glue Noiseproofing Sealant.
 - b. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - c. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.6 ACOUSTICAL SPRAY SEALANTS

- A. Acoustic Spray for exposed and concealed joints at top of non-fire-rated gypsum board partitions: Provide manufacturer's standard sprayable latex material complying with ASTM C919 and the following:

- 1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:
 - a. **Hilti; Smoke and Acoustic Spray CP 572.**

2. Spray effectively reduces airborne sound transmission through head-of-wall joints in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
3. Acoustical Spray to maintain STC ratings at sound rated partitions as indicated on the drawings.
4. Spray has flame-spread and smoke-developed ratings of less than 25 as tested in accordance with ASTM E84.
5. Spray is mold and mildew resistant per ASTM G21 with a rating of zero (0), "no growth".
6. Spray has movement capability of minimum 12.5%.
7. Proposed acoustic spray materials and methods shall conform to applicable governing codes having local jurisdiction.
8. Color: White.

2.7 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Engage a qualified testing agency shall field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform one test for the first 100 linear feet of installed sealant for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- 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.

3.7 JOINT-SEALANT SCHEDULE - WATERPROOFING, DAMPPROOFING, AND CAULKING FILED SUB BID

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Perimeter joints at frames of doors and louvers.
 - c. Control and expansion joints in ceilings and other overhead surfaces.
 - d. Other joints as indicated.
 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Penetrations in cast-in-place concrete slabs on grade.
 - c. Control and expansion joints in tile flooring.
 - d. Other joints as indicated.
 2. Urethane Joint Sealant: Multicomponent, pourable, traffic grade, Class 25.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.
- C. Joint-Sealant Application: Interior joints in all vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Control and expansion joints in all interior masonry partitions.
 - c. Perimeter joints of exterior door frames in masonry partitions.
 - d. Between drywall partitions and soffits and masonry wall surfaces.
 - e. Between window stool trim, window frame, jambs and underside of stool.

- f. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - g. Perimeter joints between interior wall surfaces and frames of exterior storefront systems.
 - h. Joints between dissimilar materials.
 - i. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing silicone.
 - 3. Joint-Sealant Color: White.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces at counters and backsplashes.
 - 1. Joint Sealant Location:
 - a. Joints between counters and backsplashes and casework/backsplash and wall surfaces.
 - b. Joints between mop receptors and wall protection panels and floors.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing silicone.
 - 3. Joint-Sealant Color: Clear.
- F. Joint-Sealant Application: Interior acoustical joints in vertical and horizontal nontraffic surfaces.
 - 1. Joint Location:
 - a. Acoustical penetrations in non-fire-rated masonry partitions.
 - b. Acoustical penetrations in non-fire-rated floors.
 - 2. Joint Sealant: Acoustical sealant.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

3.8 JOINT-SEALANT SCHEDULE – METAL WINDOWS FILED SUB BID

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces furnished and installed by the Metal Windows Filed Sub Bid.
1. Joint Locations:
 - a. Primary and secondary joints between aluminum storefront and other materials.
 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.

3.9 JOINT-SEALANT SCHEDULE - ACOUSTICAL TILE FILED SUB BID

- A. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces, furnished and installed by Division 09 Section "Acoustical Panel Ceilings" and the Acoustical Tile Filed Sub Bid.
1. Joint Location:
 - a. Acoustical joints at perimeter moldings of acoustical panel ceilings.
 2. Joint Sealant: Acoustical.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

3.10 JOINT-SEALANT SCHEDULE – GENERAL CONTRACTOR

- A. Joint-Sealant Application: Interior acoustical joints in vertical and horizontal nontraffic surfaces by Division 09 Section "Gypsum Board Assemblies."
1. Joint Sealant Locations:
 - a. Concealed acoustical penetrations in non-fire-rated gypsum board partitions.
 - b. Concealed acoustical penetrations in non-fire-rated masonry partitions.
 2. Joint Sealant: Acoustical sealant.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- B. Joint-Sealant Application: Interior acoustical joints in vertical surfaces by Division 09 Section "Gypsum Board Assemblies."
1. Joint Location:
 - a. Acoustical joints where indicated at top of non-fire rated gypsum board assemblies.
 2. Joint Sealant: Acoustical spray sealant.

SOUTHBRIDGE SENIOR CENTER
KITCHEN HOOD RENOVATIONS
SOUTHBRIDGE, MA

RENOVATION
KBA #24011.00

3. Joint-Sealant Color: White.

END OF SECTION 07 92 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following substrates:
 - 1. Concrete slabs, interior.
 - 2. Concrete masonry units (CMU).
 - 3. Exposed pipe, conduit, ductwork, etc.
 - 4. Exposed gas piping above roof.
 - 5. All other items indicated to be painted on the Drawings and Specifications.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes, conduits, and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural casework.
 - b. Metal lockers.
 - c. Prefinished flush wood doors.
 - d. Finished mechanical and electrical equipment.
 - e. Light fixtures and wiring devices.
 - f. Switchgear.
 - g. Distribution cabinets in closets or equipment rooms.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

- a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Pipe spaces.
 - e. Duct shafts.
3. Finished metal surfaces include the following:
 - a. Anodized or coated aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 3. Certification by the manufacturer that products supplied comply with Commonwealth of Massachusetts Ozone Transportation Commission (OTC) regulations controlling use of volatile organic compounds (VOCs).
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
1. Submit Samples on rigid backing, 8 inches square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 1 gallon of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall Surfaces: Provide samples of at least 100 sq. ft.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co., including the following affiliate brands:
 - a. Coronado Paint.
 - b. Corotech.
 2. PPG Industries Inc. (PPG).
 3. Sherwin-Williams Co.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content for Interior Paints and Coatings:

1. All interior paints and coatings shall comply with the VOC content regulations of the Ozone Transportation Commission (OTC) effective in the Commonwealth of Massachusetts. For interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - a. Flat Coatings: 100 g/L.
 - b. Nonflat Coatings: 150 g/L.
 - c. Nonflat-High Gloss Coatings: 250 g/L.
 - d. Primers, sealers and undercoaters: 200 g/L.
 - e. Anti-corrosive and Anti-rust Paints Applied to Ferrous Metals: 250 g/L.
 - f. Dry-Fog Coatings: 400 g/L.
 - g. Floor Coatings: 250 g/L.

C. Colors: As indicated on Finish Legend.

2.3 CONCRETE UNIT MASONRY BLOCK FILLERS

A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers **(50 g/L)**.

1. Benjamin Moore; Super Spec Masonry Hi-Build Block Filler 206: Applied at a dry film thickness of not less than 8.5 mils.
2. PPG; 6-7 SpeedHide Interior/Exterior Masonry Latex Block Filler: Applied at a dry film thickness of not less than 7.1 mils.
3. Sherwin-Williams; Prep Rite Block Filler B25W25: Applied at a dry film thickness of not less than 8.0 mils.

2.4 INTERIOR PRIMERS

A. General: Provide tinted primers as required for dark colors.

B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application **(100 g/L)**.

1. Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534: Applied at a dry film thickness of not less than 1.8 mils.
2. PPG; 6-2 Speedhide Interior Latex Sealer Quick-Drying: Applied at a dry film thickness of not less than 1.0 mil.
3. Sherwin-Williams; ProMar 200 Zero VOC Primer B28W2600: Applied at a dry film thickness of not less than 1.5 mils.

C. Interior Metal Primer: Factory-formulated metal primer (**250 g/L**).

1. Benjamin Moore; Super Spec Acrylic Metal Primer No. P04: Applied at a dry film thickness of not less than 1.7 mils.
2. PPG; 90-912 Series Pitt-Tech Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Acrylic Primer B66 Series: Applied at a dry film thickness of not less than 2.0 mils.

2.5 INTERIOR PAINTS

A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application ceilings and soffits (**50 g/L**).

1. Benjamin Moore, Ultra Spec 500 Interior Flat T535: Applied at a dry film thickness of not less than 1.8 mils.
2. PPG; 6-70 Series Speedhide Interior Latex Flat: Applied at a dry film thickness of not less than 1.3 mils.
3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Flat Wall Paint B30-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel for walls (**150 g/L**).

1. Benjamin Moore, Ultra Spec 500 Interior Eggshell T538: Applied at a dry film thickness of not less than 1.8 mils.
2. PPG; 6-411 Series Speedhide Interior Enamel Latex Eggshell: Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Egg-Shell Enamel B20-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

C. Interior Full-Gloss Acrylic Enamel for Metal Surfaces: Factory-formulated full-gloss acrylic interior enamel (**250 g/L**).

1. Benjamin Moore; Ultra Spec HP DTM Acrylic Gloss Enamel HP28: Applied at a dry film thickness of not less than 2.3 mils.
2. PPG; Pitt-Tech Plus EP DTM Acrylic 90-1510 Semi-Gloss: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Acrylic B66 Series Gloss: Applied at a dry film thickness of not less than 2.5 mils.

- D. Interior Acrylic Enamel (Flat Dryfall): Factory-formulated enamel for overhead interior application ceilings and structural framing (**150 g/L**).
1. Coronado Paint; Super Kote 5000 Latex Flat Dry Fall 110 Line: Applied at a dry film thickness of not less than 1.5 mils.
 2. PPG; SpeedHide Super Tech WB Interior Dry-Fog Flat Latex 6-725XI: Applied at a dry film thickness of not less than 2.2 mils.
 3. Sherwin-Williams; Low VOC Waterborne Acrylic Dryfall Eg-Shel B42W00082: Applied at a dry film thickness of not less than 1.9 mils.

2.6 INTERIOR CONCRETE SEALER

- A. Interior Clear Acrylic Sealer: Water-based clear sealer for use on horizontal unpainted concrete (**250 g/L**).
1. Corotech High Performance; 100% Solids Epoxy Floor Coating V430: Applied at a dry film thickness of 10 to 15 mils with V155 pre primer.
 2. PPG; Aquapon WB EP 98-E57 : Applied at a dry film thickness of not less than 2.0 mils.
 3. Sherwin-Williams; Armorseal 8100 Waterbased Epoxy Floor Coating: Applied at a dry film thickness of not less than 2.0 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Existing Masonry Substrates: For existing painted masonry and concrete surfaces indicated to receive paint, comply with the following:
 1. Remove all loose coatings and feather sand sharp edges.
 2. Clean the entire surface with a hot water degreasing solution in accordance with SSPC-SP1.
 3. Rinse the entire area with clean hot water and allow it to dry.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 PREPARATION FOR CONCRETE SLABS TO RECEIVE SEALER

- A. Prepare concrete slabs to receive clear sealer in accordance with the following. Prepare substrates according to manufacturer's written instructions to ensure adhesion of sealer.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, in accordance with ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement, or up to the manufacturer's allowed limit for the installed products.
 - b. Concrete slab substrates for testing should be at service temperature and relative humidity expected during normal use or at the conditions required for installation of a floor covering material in accordance with manufacturer's written installation instructions for at least 48 hours before making relative humidity measurements.
 - c. Perform test for the first 1,000 square feet and at least one additional test for each additional 1,000 square feet.
- C. Remove substrate coatings and other substances that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Joint Preparation: Honor all moving expansion and isolation joints up through the underlayment. Fill all non-moving joints with manufacturer's recommended filler material.

3.4 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - 2. Electrical Work:
 - a. Switchgear.
 - b. Panelboards.
 - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Unit Masonry: Provide the following finish systems over interior concrete masonry:
 - 1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a filled surface.
 - a. Block Filler: Concrete unit masonry block filler.
 - b. Finish Coats: Interior low-luster acrylic enamel.

- B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Flat Acrylic Finish (ceilings): Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior flat acrylic paint.
 - 2. Low-Luster Acrylic-Enamel Finish (Walls): Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- C. Ferrous and Zinc-Coated Metal: Provide the following finish systems over ferrous metal including metal stairs, guardrails, hollow metal doors and frames, bullet resistant doors, frames and windows, and other metal items indicated:
 - 1. Full-Gloss Acrylic-Enamel Finish: Two finish coats.
 - a. Primer: Metal primer, including factory primed surfaces.
 - b. Finish Coats: Interior full-gloss acrylic enamel for metal surfaces.
- D. Concrete: Provide the following finish systems over concrete slabs scheduled to receive sealer:
 - 1. Clear Concrete Sealer: Two finish coats.
- E. Exposed Structure: Provide the following finish system over exposed concrete structure:
 - 1. Flat Dryfall Acrylic-Enamel Finish: Two finish coat.

END OF SECTION 09 91 00

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 22 00 00 - PLUMBING

PART 1 - GENERAL	1
1.1 GENERAL PROVISIONS	1
1.2 DESCRIPTION OF WORK	1
1.3 RELATED WORK	2
1.4 CODES, ORDINANCES, AND PERMITS	2
1.5 DISCREPANCIES IN DOCUMENTS	2
1.6 MODIFICATIONS IN LAYOUT	3
1.7 SHOP DRAWING AND MATERIAL SCHEDULES	3
1.8 RECORD DRAWINGS	4
1.9 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS	4
1.10 GUARANTEE	5
1.11 DRAWINGS	5
1.12 PIPE MARKER IDENTIFICATION SYSTEM	5
1.13 FUEL GAS SYSTEM	5
1.14 EQUIPMENT FURNISHED BY OTHERS	6
1.15 DEMOLITION	6
1.16 PAINTING	7
1.17 HOISTING EQUIPMENT AND MACHINERY	7
1.18 STAGING AND SCAFFOLDING	7
1.19 BREAKDOWN	7
1.20 VISIT TO SITE	7
PART 2 - PRODUCTS	8
2.1 GENERAL	8
2.2 PIPE AND FITTINGS	8
2.3 JOINTS	8
2.4 VALVES	8
2.5 PIPING ACCESSORIES	9
2.6 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS	9
2.7 HANGERS, ANCHORS, GUIDES, AND PIERS	9
2.8 UNION AND NIPPLES	10
2.9 EMERGENCY GAS SOLENOID VALVE	10
2.10 FIRESTOP SYSTEMS	11
2.11 SCAFFOLDS AND STAGING	11
2.12 HOISTING MACHINERY AND EQUIPMENT	11
PART 3 - EXECUTION	11
3.1 WORKMANSHIP AND INSTALLATION METHODS	11
3.2 WORK COORDINATION AND JOB OPERATIONS	12
3.3 CUTTING AND CORE DRILLING	12
3.4 CLEANING AND PROTECTION	13
3.5 SLEEVES, INSERTS, AND ESCUTCHEONS	13
3.6 TESTING	14
3.7 INSTALLATION OF FIRESTOP SYSTEMS	14

3.8 SYSTEM SHUTDOWNS..... 14

END OF INDEX

SECTION 220000 - PLUMBING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. All the Contract Documents and General Provisions of the Contract including, but not limited to, General and Supplementary Conditions, and Division 1 Specification Sections apply to this Section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.
- B. The work covered by this Section of the Specifications includes the furnishing of all labor and materials and in performing all operations in connection with the installation of the Plumbing Work.
- C. Without limiting the generality thereof, the work to be performed under this Section includes:
 - 1. Natural Gas System.
 - 2. Kitchen Gas Solenoid Valve.
 - 3. Flushing, Sterilization, and Tests
 - 4. Drilling, Coring and Cutting & Patching of holes and openings where the largest dimension thereof does not exceed 12 inches for Plumbing Piping and Equipment.
 - 5. Demolition of existing Plumbing Equipment and Disconnecting, Capping, and otherwise making inactive, all existing Plumbing Services in the various areas where Demolition and Removal Work is required; and removing, relocating, and reinstalling existing Plumbing items to the extent specifically noted in the documents. Remove all piping hangers and equipment in accordance with the description in paragraph 1.15.
 - 6. Scaffolding, Rigging, and Staging required for all Plumbing Work. Comply with Division 1 requirements.
 - 7. Smoke and Firestopping Seals and sealing of all wall and floor penetrations as detailed on the drawings. Refer to Section 078400 which defines the firestopping materials and methods.
 - 8. When open-flame or spark producing tools such as blower torches, welding equipment, and the like are required in the process of executing the work, the General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant non-working fire watch, paying all fees, where work is being performed and until it is completed. Fee for fire watch shall be included in the bid.

1.3 RELATED WORK

A. The following Related Work will be performed under the designated Sections:

1. Cutting and Patching beyond 1.2C.4 above: SECTION 017329 - CUTTING AND PATCHING
2. Installation Of Flashing for plumbing penetrations through roof: SECTION 075400 – THERMOPLASTIC MEMBRANE ROOFING
3. Electric Power Wiring: SECTION 260000 - ELECTRICAL
4. HVAC Equipment: SECTION 230000 – HVAC
5. Finish Painting: SECTION 099000 – PAINTING AND COATING
6. Temporary Facilities: SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

1.4 CODES, ORDINANCES, AND PERMITS

- A. Perform all work in accordance with the requirements of the Town of Southbridge Building Department, Massachusetts State Plumbing and Fuel Gas Codes, D.E.P., A.D.A., NFPA, The Architectural Barrier Code, and applicable State and Federal Laws. Give all requisite notices, file all requisite plans, and obtain all permits required to perform all Plumbing Work. Where the Contract Documents indicate more stringent requirements than the above Codes and Ordinances, the Contract Documents shall take precedence.
- B. Obtain all permits, inspections, and approvals, from the governing authorities and pay all fees and include cost in the bid.
- C. Owner will pay all related Gas Utility Company back charges.

1.5 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 unclarities 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.

1.6 MODIFICATIONS IN LAYOUT

- A. HVAC, Plumbing and Electrical 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, 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.

1.7 SHOP DRAWING AND MATERIAL SCHEDULES

- A. Refer to SECTION 013300 – SUBMITTAL PROCEDURES for submittal of Shop Drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in or additional connections, piping, supports or construction, same shall be provided as the responsibility, and at the expense, of the Plumbing Subcontractor.

- B. Fabrication of any material or performing of any work prior to the final approval of the Submittals will be entirely at the risk of the Subcontractor. The Subcontractor is responsible for furnishing and installing materials called for in the Contract Documents, even though these materials may have been omitted from approved Submittals.
- C. Submit Shop Drawings for the following materials and equipment.
 - 1. Valves, Piping, couplings and Fittings
 - 2. Equipment including Supports
 - 3. Hangers, Anchors, Guides, and Supports

1.8 RECORD DRAWINGS

- A. General: Refer to SECTION 01 78 39 – PROJECT RECORD DOCUMENTS for general requirements for maintaining as-built drawings and submitting final reproducible record documents.
- B. The General Contractor will provide two sets of Drawings to the Plumbing Subcontractor, one set of which shall be maintained at the site and which shall, at all times, be accurate, clear, and complete, showing the actual locations of all equipment and piping as it is being installed. The Record Drawings shall be available to the Architect/Engineer's field representative at all times.
- C. Provide electronic AutoCAD drawings to indicate revisions to piping size and location both exterior and interior; including locations of valves and other equipment requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located.
- D. Include in the Record Drawings any addenda, sketches, and supplementary Drawings issued during the course of construction.
- E. Non-availability of Record Drawings or inaccuracies therein will postpone the final inspection until they are available.
- F. All costs related to the foregoing requirements shall be paid by the Plumbing Subcontractor.

1.9 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Provide operating instructions to the Owner's designated representative with respect to operation functions and maintenance procedures for all equipment and systems installed. At the completion of the project, turn over to the Architect four (4) complete manuals, in three-ring, loose-leaf binders, containing the following:
 - 1. Complete Shop Drawings of all equipment.
 - 2. Operation description for all systems.
 - 3. Names, addresses, and telephone numbers of all suppliers of the system.
 - 4. Preventative maintenance instructions for all systems.

5. Spare parts lists of all system components.
6. Provide USB Drive with electronic copies of Items 1-5 above.

1.10 GUARANTEE

- A. Refer to Division 1 of the Contract. Guarantee all work under this Section free from defects in workmanship and materials for a period of one (1) year from the date of final acceptance of the building, as set forth in the Contract. Replace any such defective work developing during this period, unless such defects are clearly the result of bad usage of equipment by others. Where such defective work results in damage to work of other Sections of the Specifications, restore such work to its original condition by mechanics skilled in the affected trade.

1.11 DRAWINGS

- A. All work shown on the Drawings is intended to be approximately correct to scale, but shall be taken in a sense as diagrammatic. Sizes of pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make complete working systems ready for use.
- B. The Plumbing Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.
- C. Refer to the Architectural, Structural, and other Mechanical and Electrical Drawings, which indicate the construction in which this Work shall be installed. Locations shown on the plans shall be checked against the general and detailed Drawings of the construction proper. All measurements shall be taken at the Building.

1.12 PIPE MARKER IDENTIFICATION SYSTEM

- A. Mark all piping installed under this Section and at all Access Panels with a marking system in basic colors conforming to those specified in ANSI/ASME A-13.1. Markings shall indicate pipe content and direction of flow. Markers shall be applied at all valves and tee joints, and on straight runs of pipe at every 20 ft.-0 in. on center.
- B. Markers shall be vinyl snap-around pipe type system. Adhesive markings are not acceptable.

1.13 FUEL GAS SYSTEM

- A. Furnish and install a complete Natural Gas Supply System including pipe, fittings, valves, connections to all gas fired equipment requiring gas, and all accessories and incidentals as indicated or specified. Installation shall be made in accordance with the State Gas Code requirements. Piping shall be installed with an 8 in. long sediment leg at the base of all risers. All changes in direction shall be made with plugged tees for cleaning piping out.

- B. All horizontal Gas Piping shall be pitched not less than 1/4 in. in 15 ft. to prevent traps. Pitch piping to risers. Install an 8 in. long sediment leg at the base of all risers. All changes in direction shall be made with plugged tees for cleaning piping out. All horizontal branch outlet pipes shall be taken from the top or side of horizontal mains and not from the bottom. Install shutoff valves for each battery of equipment and other valves as necessary to isolate any part of each system.
- C. Where interior gas vented appliances are provided provide a battery powered, carbon monoxide detector adjacent to the appliance.
- D. Arrange with the Local Gas Company for the installation of the gas meters, services, and gas pressure regulators. Refer to DIVISION 01 - GENERAL REQUIREMENTS for information regarding Utility Company Charges.

1.14 EQUIPMENT FURNISHED BY OTHERS

- A. Miscellaneous items, including but not necessarily limited to the following, shall be furnished and set by others as specified in other SECTIONS of the Documents.
 - 1. Kitchen Equipment
- B. The Plumbing Subcontractor shall be responsible in making final connections to all equipment furnished by others within the scope of work.

1.15 DEMOLITION

- A. When and as directed by the General Contractor perform all demolition work.
- B. All hangers, valves, piping, and other miscellaneous equipment and materials in the existing building not specifically designated for reuse in the documents shall remain the property of the Owner.
- C. Remove as indicated existing piping and equipment including all hangers and supports and disconnect all Plumbing connections to equipment to be removed under other Sections of the Specifications. Clean, recondition, and relocate where indicated all items to be reused.
- D. In cases where main piping is to remain, remove all existing piping to fixtures being removed and cap said piping back to riser or main. All caps or plugs to be installed shall be of like material as pipe being capped or plugged.
- E. All piping, valves, hangers, and fittings shall be removed from roof, ceiling, and walls as indicated and placed on the floor by this Section. The General Contractor shall remove from the floor and dispose.

- F. Any disputes between this Subcontractor and other Contractors or Subcontractors relative to the responsibility for removal of equipment shall be referred to the Architect for decision. The Architect's decision shall be firm and binding and to whomever he designates responsibility for removal of equipment shall do so without any additional cost to the Owner.

1.16 PAINTING

- A. All exposed piping and hangers shall be thoroughly cleaned of rust, oil, and other containments by the Plumbing Subcontractor and left ready to receive primer coat.
- B. Painting for pipe markings shall be done under this Section.
- C. Painting of exterior gas piping at gas meter and on roof shall be done under this Section.

1.17 HOISTING EQUIPMENT AND MACHINERY

- A. Unless otherwise specified, all hoisting and rigging equipment and machinery required for the proper and expeditious prosecution and progress of the Work of this Section shall be furnished, installed, operated and maintained in safe condition by each sub-contractor, as specified under Section 015000, TEMPORARY FACILITIES AND CONTROLS.

1.18 STAGING AND SCAFFOLDING

- A. Unless otherwise specified, each sub-contractor shall provide all lifts and man-lifts, and furnish, erect and maintain in safe condition, all staging and scaffolding as specified under Section 015000 Temporary Facilities and Controls, as needed for proper execution of the work of this Section. Staging and scaffolding shall be of adequate design, erected and removed by experienced stage builders having all accident prevention devices required by Federal, state and local laws.

1.19 BREAKDOWN

- A. Submit a breakdown of the contract price to aid the Architect in determining the value of the work installed as the job progresses.
- B. No requisition will be approved until the breakdown is delivered to the Architect.

1.20 VISIT TO SITE

- A. Prior to submitting a Bid, visit the site of work and become familiar with existing conditions. Any assumptions made are at this Subcontractor's expense.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and equipment furnished under this SECTION shall be new, unused, first quality of a manufacturer of established reputation. Each valve, fitting, section of pipe, and piece of equipment supplied to project shall have cast or indelibly stamped thereon the manufacturer's name, pressure rating where applicable, type, and any other specific information provided by manufacturer. Materials shall conform to Massachusetts Code as a minimum requirement and shall appear on the Massachusetts Approved Plumbing Products list.

2.2 PIPE AND FITTINGS

- A. Pipe and fittings shall conform to the latest A.S.A., A.S.T.M., C.A., and F.S. standards.
- B. All piping installed under this SECTION shall be in accordance with the following:

<u>Service</u>	<u>Material</u>
Gas piping above ground	ASTM A-53 Schedule 40 black steel pipe
Gas piping exposed in kitchen and at cooking island	ASTM A-53 Schedule 40 steel but painted with two (2) coats of white epoxy paint
C. Fittings for gas piping 2-inch and smaller shall be threaded malleable iron gas pattern fittings for screwed pipe. All gas piping 2 ½ inch in size and larger shall be welded and shall utilize butt welded steel pipe fittings.	

2.3 JOINTS

- A. Threaded pipe joints including plastics shall be made up with teflon tape.
- B. Joints on screwed gas piping shall be made up with thread compound on male threads only. Welded joints shall be made up by certified welders. All joints on piping 2-1/2 in. and larger shall be welded.

2.4 VALVES

- A. Furnish and install valves where indicated on the Drawings or where specified and located so that they may be operated, repaired, or replaced with a minimum effort and repacked under pressure.

- B. The following list of valves is intended only as a guide for type and quality. Valves shall be as manufactured by Apollo, Milwaukee, Nibco, Elkhart, Watts, Victaulic, or approved equal.

Gas service stops, 2 in. and smaller	Apollo #70-102-07 through #70-108-07 with tee handle
Gas service stops, 2-1/2 in. and larger	Rockwell #143 lubricated plug valve

2.5 PIPING ACCESSORIES

- A. Natural gas system pressure gauges shall be 4 inch diameter with a range of 0 to 30 inches of water as manufactured by Weiss Instruments, U.S. Gauge, Trerice or equal.

2.6 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS

- A. Furnish and install all supplementary steel, channels, and supports required for the proper installation, mounting, and support of all equipment.
- B. Supplementary Steel and Channels shall be firmly connected to building construction in a manner approved by the Architect.
- C. The type and size of the Supporting Channels and Supplementary Steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All Supplementary Steel and Channel shall be installed in a neat and workmanlike manner parallel to the walls, floor, and ceiling construction. All turns shall be made with 90 deg. fittings, as necessary to suit the construction and installation conditions.

2.7 HANGERS, ANCHORS, GUIDES, AND PIERS

- A. All piping shall be supported from the Building Structure by means of approved hangers and supports. Piping shall be supported to maintain required 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.
- B. Hangers shall not be installed directly into the roof deck. Provide supplementary steel per paragraph 2.6 above as required to support piping from structure.
- C. The spacing for hangers for horizontal piping shall be in accordance with the following:
1. Steel Pipe: 10 ft.-0 in. o.c. for 1-1/2 in. and over; 8 ft. - 0 in. for 1-1/4 in.; 6 ft. - 0 in. for 1 in. and smaller.

- D. Hanger rod diameter shall be as follows:

Pipe Size	Rod Diameter
1/2 in. thru 2 in.	3/8 in.
2-1/2 in. and 3 in.	1/2 in.
4 in. and 5 in.	5/8 in.
6 in.	3/4 in.
8 in. and over	7/8 in.

- E. Vertical lines shall be adequately supported at their bases by a suitable hanger placed in the horizontal line near the riser and at every 10 ft. interval.
- F. All Hangers shall be adjustable Clevis Hanger. Hanger rods shall have machine threads. Malleable iron brackets of approved type shall be used along the walls.
- G. Piping shall not be hung from the hangers of other trades.
- H. Hangers shall be manufactured by Grinnell, Carpenter and Paterson, Fee and Mason, or equal.
- I. Wire and strap hangers will not be permitted in this installation.

2.8 UNION AND NIPPLES

- A. All connection to equipment requiring maintenance or alteration shall be made up with unions. Unions on brass piping, 2 in. and smaller, shall be brass composition "E" in strict accordance with Federal Specification WW-U-516. On plastic piping, use unions of the same material as the piping.
- B. All close and shoulder nipples shall be corresponding materials as the pipe and shall be extra heavy.

2.9 EMERGENCY GAS SOLENOID VALVE

- A. Emergency gas solenoid valve shall be normally closed FM approved gas solenoid valve ASCO "Red-Hat" Series 8040/8215. Valve shall operate on 120volt power and shall close the gas flow on the main gas feed to the Kitchen cooking equipment. This solenoid valve is furnished and installed by Section 220000.
- B. Gas solenoid valves shall be manufactured by ASCO, QMI, ISIMET, or equal.

2.10 FIRESTOP SYSTEMS

- A. General: Provide firestopping at all new fire-rated construction where penetrated by the Work of this Section.
- B. Refer to Section 078413 – Penetration Firestopping, for all product requirements for maintaining integrity of fire-rated construction at penetrations.

2.11 SCAFFOLDS AND STAGING

- A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - Temporary Facilities and Controls and herein.
 - 1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - Temporary Facilities and Controls shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor requiring such scaffolding.
 - 2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - Temporary Facilities and Controls and as additionally required for dust control).
 - 3. General Contractor is responsible to provide enclosures required for temporary heat; refer to Section 01 50 00 - Temporary Facilities and Controls.
 - a. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Trade Contractor.

2.12 HOISTING MACHINERY AND EQUIPMENT

- A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - Temporary Facilities and Controls.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND INSTALLATION METHODS

- A. All work shall be installed in a first-class manner consistent with the best current practices. All materials shall be securely installed plumb and/or level, and all flush mounted equipment shall have front edge flush with finished wall surface.

- B. All piping shall be installed true to line and grade in the case of underground piping. All piping above ceilings or exposed shall be grouped together, be parallel to each other, and be either parallel or perpendicular to the structure. Utilize gang hangers wherever feasible. Group all valves together where feasible.
- C. Training:
 - 1. Train the Owner's maintenance personnel on troubleshooting procedures, and servicing and preventative maintenance schedules and procedures.
 - 2. Schedule training with Owner through the Architect with at least 7 days prior notice.

3.2 WORK COORDINATION AND JOB OPERATIONS

- A. The equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same.
- B. Particular attention shall be directed to the coordination of piping and other equipment installed in the ceiling areas. Coordinate the elevations of all piping in hung ceiling areas to insure adequate space for the installation of recessed lighting fixtures before other mechanical equipment is installed.
- C. Furnish to the General Contractor, and all other Subcontractors, all information relative to the portion of the Plumbing installation that will affect them, sufficiently in advance so that they may plan their work and installation accordingly.
- D. In case of failure to give proper information as indicated above sufficiently in advance, pay for all back-charges for the modification, renovation, and relocation of any portion of the work already performed.
- E. Obtain from the other trades, all information relative to the Plumbing Work to be executed in conjunction with the installation of their respective equipment.

3.3 CUTTING AND CORE DRILLING

- A. Perform all cutting and core drilling operations that are outlined in Part 1 of this SECTION. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the walls, floors, overhead structure, and other structural components, which are to remain, is maintained until permanent work is installed. Prior to any coring or cutting, verify all locations of same with the General Contractor. All cutting and coring is to be performed in accordance with approved Coordination Drawings
- B. Cut all masonry and concrete with an approved diamond blade concrete saw in a neat straight direction, perpendicular to the plane of the wall or floor.
- C. Use a core drilling process which produces clean, sharp edges and the minimum hole size which will accommodate the size of pipe sleeve specified. Submit procedures for cutting thru existing steel beams to Architect for review.

- D. The patching of holes shall be performed by Plumbing Sub-contractor utilizing methods outlined for the finish trade involved. Holes shall be patched to the satisfaction of the Architect.

3.4 CLEANING AND PROTECTION

- A. Protect all materials and equipment during shipment and so as to prevent damage. Water closets, lavatories, and sinks shall be boarded over and all other fixtures shall be protected with pasted on paper. Post notice prohibiting the use of the fixtures prior to completion. Assume full responsibility for protection of work until its completion and final acceptance.
- B. Keep the premises reasonably clean at all times and remove rubbish caused by the Plumbing Work as directed by the Architect.
- C. Upon completion of this work, clean all fixtures and equipment installed herein and replace damaged parts. Failure to fulfill this obligation will result in back-charges for correction of the defective work.

3.5 SLEEVES, INSERTS, AND ESCUTCHEONS

- A. All piping passing through slabs, floors, walls, partitions, foundation walls and grade beams, shall be sleeved and all such sleeves shall be furnished and installed by the Plumbing Subcontractor as detailed on the Drawings and herein specified. Set sleeves in concrete floors and walls as soon as forms are set and before concrete is poured. Core drilling openings shall have a sleeve caulked and grouted in place.
- B. All pipes passing through floor, whether slab-on grade or above grade levels, shall be sleeved with sleeve extending 1 in. above floor. This includes all piping in toilet room pipe space, stairwells, closets, partitions and pre-cast planks.
- C. All sleeves shall be Schedule 40 galvanized steel and shall be reamed. There shall be a minimum of 1 in. annular space between the sleeve and pipe provide greater clearance where seismic requirements dictate. Sleeves on insulated pipe shall be large enough to allow insulation to pass through sleeve. Sleeves on drywall, masonry, or concrete walls and partitions, shall be flush with wall on both sides.
- D. The space between sleeve and pipe in all cases shall be filled with a U.L./F.M. approved caulking compound. This includes pipes concealed in chases and/or partitions.
- E. Inserts where required shall be furnished and set by the Plumbing Subcontractor and where necessary may be drilled or power driven and shall be sized such that the insert will not exceed a depth of penetration of 1 in. into concrete.
- F. Escutcheons: All exposed pipe, uncovered, passing through walls or floors or ceilings shall be fitted with C.P. brass spun or split type escutcheons with approved clamping device for holding in position. Floor escutcheons shall be deep enough to fit over sleeves, fastened to pipe, and extend down to floor.

3.6 TESTING

- A. Test all Work in the presence of the Architect and/or Engineer and as required by Local Codes.
- B. Test gas piping per State Gas Code.
- C. Any leaks in joints or evidence of defective pipe on fittings disclosed by test shall be immediately corrected by replacing defective parts with new joints or materials. No makeshift repair effected by caulking threaded pipe with lead wool, application or Wilky or patented compounds will be permitted.
- D. Provide testing report for all systems tested.

3.7 INSTALLATION OF FIRESTOP SYSTEMS

- A. General: Install firestop systems at all fire-rated construction where penetrated by the Work of this Section.
- B. Refer to Section 078413 – Penetration Firestopping, for all installation requirements for maintaining integrity of fire-rated construction at penetrations.

3.8 SYSTEM SHUTDOWNS

- A. Coordinate shutdowns of existing systems with the Owner and submit a written request at least ten working days in advance. Minimize system shut downs as much as possible. Submit a list of all affected areas, the proposed work to be performed, and the expected length of the shut-down including time for retesting.
- B. Provide temporary services to maintain active system during extended shut-downs as required for demolition and construction phasing.

END OF SECTION

SECTION 23 00 00 - HVAC

PART 1 - GENERAL	1
1.1 GENERAL REQUIREMENTS	1
1.2 DESCRIPTION OF WORK	1
1.3 WORK TO BE PERFORMED	1
1.4 RELATED SECTIONS	2
1.5 CODES, ORDINANCES, AND PERMITS	2
1.6 QUALITY ASSURANCE	3
1.7 HAZARDOUS MATERIALS	4
1.8 DISCREPANCIES IN DOCUMENTS.....	4
1.9 CONTRACT DRAWINGS	5
1.10 COORDINATION DRAWINGS	5
1.11 ACCESSIBILITY	6
1.12 ROUGH IN	6
1.13 NOTIFICATION OF RELATED TRADES.....	6
1.14 MECHANICAL INSTALLATIONS.....	6
1.15 CUTTING AND PATCHING	7
1.16 SUBMITTALS	7
1.17 SUBSTITUTIONS.....	8
1.18 PRODUCT LISTING	8
1.19 NAMEPLATE DATA	9
1.20 DELIVERY, STORAGE AND HANDLING	9
1.21 RECORD DOCUMENTS	9
1.22 OPERATION AND MAINTENANCE DATA	9
1.23 WARRANTIES	10
1.24 ENERGY REBATE PROGRAM	11
1.25 HOISTING EQUIPMENT AND MACHINERY	11
1.26 STAGING AND SCAFFOLDING	11
1.27 WELDING QUALIFICATIONS.....	11
1.28 TRADE RESPONSIBILITY FOR INTERCONNECTIONS MATRIX	12
PART 2 - PRODUCTS	13
2.1 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT	13
2.2 HANGERS & ATTACHMENTS (Refer to SECTION 230548 for Coordination).....	16
2.3 MECHANICAL IDENTIFICATION	18
2.4 MECHANICAL INSULATION	20
2.5 GREASE DUCT INSULATION	23
2.6 HYDRONIC PIPING AND ACCESSORIES	24
2.7 KITCHEN GAS FIRED MAKE-UP AIR UNIT (MAU)	31
2.8 POWER AND GRAVITY VENTILATORS	32
2.9 METAL DUCTWORK.....	34
2.10 DUCTWORK ACCESSORIES	46
2.11 ACOUSTIC DUCT LINING	50
2.12 AIR OUTLETS AND INLETS	50
2.13 FIRESTOP SYSTEMS	53
2.14 WALL AND CEILING ACCESS DOORS.....	53

2.15	AUTOMATIC TEMPERATURE CONTROLS (DDC)	54
PART 3 - EXECUTION		54
3.1	CUTTING AND PATCHING	62
3.2	INSTALLATION OF HANGERS & ATTACHMENTS	62
3.3	INSTALLATION OF MECHANICAL IDENTIFICATION	64
3.4	INSTALLATION OF MECHANICAL INSULATION	65
3.5	INSTALLATION OF GREASE DUCT INSULATION	67
3.6	INSTALLATION OF KITCHEN GAS FIRED MAKE-UP AIR UNITS (MAU)	69
3.7	INSTALLATION OF POWER AND GRAVITY VENTILATORS	71
3.8	INSTALLATION OF METAL DUCTWORK	72
3.9	INSTALLATION OF DUCTWORK ACCESSORIES	73
3.10	INSTALLATION OF ACOUSTIC DUCT LINING	74
3.11	INSTALLATION OF AIR OUTLETS AND INLETS	74
3.12	INSTALLATION OF FIRESTOP SYSTEMS	74
3.13	INSTALLATION OF WALL AND CEILING ACCESS DOORS	75
3.14	AUTOMATIC TEMPERATURE CONTROLS (DDC)	75
3.15	TESTING, ADJUSTING, AND BALANCING	77

END OF INDEX

SECTION 230000 - HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

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. All Work of Section 230000 HVAC
 - 2. All HVAC related components, equipment, piping and devices requiring vibration control as indicated within Specification Section 230548 – VIBRATION CONTROL shall be the responsibility and requirement of the HVAC Subcontractor.

1.3 WORK TO BE PERFORMED

- A. The work described herein shall be interpreted as work to be done by the HVAC Subcontractor. Work to be performed by other trades will always be specifically referenced to that trade.
- B. Furnish all staging, rigging, temporary supports labor and materials to perform all operations in connection with the installation of the HVAC work. Refer to Section 015000 for coordination of requirements by this trade subcontractor.
- C. Without limiting the generality thereof, the work to be performed under this section includes complete new HVAC systems with the following major sub systems:
 - 1. Exhaust Fans
 - 2. Ductwork With Insulation, Diffusers, Registers And Grilles
 - 3. Makeup Air Units
 - 4. Direct Digital Automatic Temperature Controls
 - 5. Testing Adjusting and Balancing
- D. Refer to Section 230548 "Vibration Control" for additional work to be provided under this Section 230000.
- E. Firestop systems in accordance with section 078413 – Penetration Firestopping.
- F. Cutting through non-masonry construction in accordance with section 017329 – Cutting and Patching.
- G. Include the following work as needed to perform the work of this section.
 - 1. Core drilling in accordance with SECTION 017329 – CUTTING AND PATCHING.
 - 2. Temporary facilities, including but not limited to stairs and ladders, staging, scaffolding, chutes and hoisting in accordance with SECTION 015000 –TEMPORARY FACILITIES AND CONTROLS.

- H. Change all air handling unit (RTU, AC, MAU, DCU) filters as required prior to owner turnover.

1.4 RELATED SECTIONS

- A. The following work is included in other sections. Coordinate the work of this section as required per those sections.
- B. For temporary controls refer to Section 015000. If Owner authorizes use of the permanent HVAC system for temporary use during construction, provide temporary controls to adequately control the unit and not void the warranty. Coordinate extent of temporary controls with General Contractor. Use of the new equipment for temporary heat will not start product warranty until substantial completion is achieved. Clean unit, ductwork and change filters prior to using equipment for building occupancy by the Owner. This requirement is in addition to any other filter changes or filter requirements indicated throughout this specification.
- C. For flashing of vents through roof and setting of roof curbs and flashing of such, refer to Section 075400 THERMOPLASTIC MEMBRANE ROOFING.
- D. For power wiring of mechanical equipment refer to Section 260000.
- E. For structural steel refer to Section 051200 STRUCTURAL STEEL.
- F. For firestopping not called for in this Section refer to Section 078413 PENETRATION FIRESTOPPING.
- G. For finished painting of mechanical systems not called for in this Section refer to Section 099000 PAINTING AND COATING.
- H. For Food Service Equipment refer to drawings.
- I. The following work is included in other sections. Coordinate the Work of this Section as required:
 - 1. Cutting and patching in masonry construction, and associated lintels.
 - 2. Patching of non-masonry construction.

1.5 CODES, ORDINANCES, AND PERMITS

- A. Perform all work in accordance with the requirements of Town of Southbridge Building Department, State of Massachusetts Building Code, 9th Edition, and applicable State and Federal Laws. Give all requisite notices, file all requisite plans, and obtain all permits required to perform HVAC Work.
- B. Permits: Be responsible for filing documents, and securing of inspection and approvals. Pay all local connection and permit fees. Costs related to temporary service, refer to Section 015000 TEMPORARY FACILITIES AND CONTROLS.
- C. All HVAC equipment shall be installed to meet all State, Local and Federal sound ordinances.

1.6 QUALITY ASSURANCE

A. Codes and Standards:

1. HI Compliance: Design, manufacture, and install HVAC pumps in accordance with HI Hydraulic Institute Standards".
2. UL Compliance: Design, manufacture, and install HVAC pumps in accordance with UL 779 "Motor Operated Water Pumps".
3. ANSI Standards: Comply with ANSI A13.1 for pipe, valve, and equipment identification.
4. I=B=R Compliance: Provide boilers that have been tested and rated in accordance with Institute of Boiler and Radiator Manufacturers (I=B=R) "Testing and Rating Standard for Cast Iron and Steel Heating Boiler", and bear I=B=R emblem on nameplate affixed to boiler.
5. NFPA Compliance: Install boilers in accordance with NFPA Standard 54.
6. ASME Compliance: Construct cast iron boilers in accordance with ASME Boiler and Pressure Vessel Code, Section IV "Heating Boilers".
7. UL and NEMA Compliance: Provide boiler ancillary electrical components and safety control devices, which have been listed and labeled UL, and comply with NEMA Standards.
8. FM Compliance: Provide control devices and control sequences in accordance with requirements of Factory Mutual System (FM).
9. IRI Compliance: Provided control devices and control sequences in accordance with requirements of Industrial Risk Insurance (IRI).
10. AMCA Compliance: Test and rate air handling units in accordance with AMCA standards.
11. AGA Compliance: Provide gas controls and devices in accordance with American Gas Associates.
12. ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", display certification symbol on units of certified models.
13. ASHRAE Compliance: Construct and install refrigerant coils in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
14. NFPA Compliance: Provide air handling unit internal insulation having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
15. UL and NEMA Compliance: Provide electrical components required as part of air handling units, which have been listed and labeled by UL and comply with NEMA standards.
16. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.
17. NE-CHPS: Install all HVAC systems in accordance with all current requirements.

B. MSS Standard Practices: Comply with the following standards for valves:

1. MSS SP-45: Bypass and Drain Connection Standard
2. MSS SP-67: Butterfly Valves
3. MSS SP-70: Cast Iron Gate Valves, Flanged and Threaded Ends
4. MSS SP-71: Cast Iron Swing Check Valves, Flanged
5. MSS SP-72: Ball Valves with Flanged or Butt-Welding Ends for General Service
6. MSS SP-78: Cast Iron Plug Valves, Flanged and Threaded Ends
7. MSS SP-80: Bronze Gate, Glove Angle and Check Valves
8. MSS SP-84: Steel Valves - Socket Welding and Threaded Ends

9. MSS SP-85: Cast Iron Globe and Angle Valves, Flanged with Threaded Ends
10. MSS SP-92: MSS Valve User Guide

C. Automatic Temperature Control subcontractor Qualifications: Branch Factory Owned Authorized dealers specializing in manufacturing and installation of control system for not less than 5 years.

1. Codes and Standards:
 - a. Electrical Standards: Provide electrical components of control systems which have been UL-listed and labeled, and comply with NEMA standards.
 - b. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.7 HAZARDOUS MATERIALS

A. The HVAC Subcontractor shall be responsible for removing and legally disposing of any and all hazardous waste associated with HVAC systems, including but not limited to:

1. All chemical treatment used in flushing out HVAC piping systems.
2. Un-used excess material such as adhesives used in ductwork and piping installations.
3. Refrigerant in all AC systems to be removed.
4. Murcery Thermostats
5. Items specifically noted on drawings.

1.8 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications conflict or are unclear, advise Architect in writing before Award of Contract. Otherwise, Architect's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted.

B. Where Drawings or Specifications do not coincide with manufacturers recommendations, or with applicable codes and standards, alert Architect in writing before installation.

C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this subcontractor shall provide that material, installation, or work which is of the more stringent.

D. It is the intent of these contract documents to have the HVAC subcontractor 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 system. In cases such as this, where the HVAC subcontractor has failed to notify the Architect of the situation in accordance with Paragraph (A) above, the HVAC subcontractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner.

1.9 CONTRACT DRAWINGS

- A. All work shown on the drawings is intended to be approximately correct to scale, but shall be taken in a sense as diagrammatic. Sizes of ductwork and pipes and general method of running them are shown, but it is not intended to show every offset and fitting. To carry out the true intent and purpose of the plans, furnish all necessary parts to make complete working systems ready for use.
- B. The HVAC Drawings and Specifications are intended to supplement each other so that any details shown on the Drawings and not mentioned in the Specifications, or vice-versa, shall be executed the same as if mentioned in the Specifications and shown on the Drawings.
- C. Refer to the Architectural, Structural, Mechanical, Plumbing, Fire Protection and Electrical Drawings which indicate the construction in which this work shall be installed. Locations shown on the plans shall be checked against the general and detailed Drawings of the construction proper. All measurements must be taken at the building.

1.10 COORDINATION DRAWINGS

- A. Coordination requirements specific to the Work of this Section include the following:
 - 1. Before materials are purchased or work is begun, the respective Subcontractor shall prepare and submit to the Architect Coordination Drawings showing the size, elevation and location of his equipment, fixtures, ductwork, conduit, and piping lines relevant to the complete system. He shall ensure that these drawings are compatible and correctly annotated and cross-referenced at their interfaces.
 - 2. Coordination drawings are for the Contractor's and the Architect's use during construction and shall not be construed as replacing any shop or record drawings required elsewhere in the Contract Drawings.
 - 3. All coordination drawings shall be prepared in a large enough scale to accurately identify work of each trade and in addition to each sub-contractors systems, shall also show architectural floor plan, reflected ceiling plan, and structural framing with grid identification.
 - 4. The coordination drawing shall be prepared utilizing a 3D modeling CAD program and shall be started by the HVAC sub-contractor and after applying all ductwork, the drawing shall be submitted for ductwork approval by the engineer. After approval, the drawing shall be circulated to the remaining sub-contractors for application of their work.
 - 5. During coordination drawing preparation the sub-contractors shall meet periodically to discuss overall coordination of all sub systems, and shall adjust their systems accordingly. When all drawings are complete the general contractor shall submit to the architect and engineers for review.
 - 6. Areas of conflict that cannot be resolved between the sub-contractor must be flagged on the drawings with adequate information to assist the architect and engineer in resolving noted issues.
 - 7. Associated with all costs, additional time to redraw coordination drawings for areas in conflict will be completed at no additional cost to the owner or project.
- B. Refer to Section 013100 of these Contract Documents for general requirements and additional procedures relative to the preparation of Coordination Drawings.

1.11 ACCESSIBILITY

- A. Install equipment and materials to provide required access for servicing and maintenance and ensure all code required clearances are achieved. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- B. Extend all grease fittings to an accessible location.

1.12 ROUGH IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

1.13 NOTIFICATION OF RELATED TRADES

- A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvers when ready for such installation and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.
- B. Leave openings in walls for pipes, and ducts for mechanical and electrical work as shown on drawings or required by layout of mechanical or electrical systems.

1.14 MECHANICAL INSTALLATIONS

- A. Coordinate mechanical equipment and materials installation with other building components before installing.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
- G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

- I. Coordinate connection of mechanical system with overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.15 CUTTING AND PATCHING

- A. Penetrations through construction as required for the work of this Section:
 - 1. Coring: Perform all coring for required work.
 - 2. Cut openings in new and existing non-masonry construction where required for penetrations. All cutting shall conform to the requirements of Section 017329 – CUTTING AND PATCHING.
- B. Throughout the performance of the cutting and coring work, ensure that the structural integrity of the existing walls, floors, overhead structure, and other structural components, which are to remain, is maintained until permanent work is installed. Prior to any coring or cutting verify all locations of same with the General Contractor . All cutting and coring is to be performed in accordance with approved coordination drawings. All cutting or coring of structural must receive approval of the Architect prior to proceeding.
- C. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- D. Patching of surfaces shall be by the trade responsible for the surface penetrated.
- E. Refer to related architectural sections including Section 013100 and Section 017329.

1.16 SUBMITTALS

- A. General: Refer to Section 013300 – SUBMITTAL REQUIREMENTS for general requirements for submittal of product data, shop drawings and other materials for review by the Architect and their Consultants. The following paragraphs supplement the requirements of Section 013300.
- B. Submittal of Shop Drawings, product data, and samples will be accepted only when submitted by the General Contractor . Data submitted by Sub-contractors and material suppliers directly to the Architect/Engineer will not be processed.
- C. Submittal requirements specific to the Work of this Section include the following:
 - 1. Hangers and Attachments
 - 2. Mechanical Identification
 - 3. Mechanical Insulation
 - 4. Kitchen Make-Up Air Unit
 - 5. Power and Gravity Ventilators
 - 6. Metal Ductwork
 - 7. Ductwork Accessories
 - 8. Air Outlets and Inlets
 - 9. Acoustic Lining
 - 10. Automatic Temperature Controls
 - 11. Testing, Adjusting and Balancing

- D. If a Shop Drawing is not accepted after two submissions, a third submission from the same manufacturer will not be considered.
- E. Check Shop Drawings and other submittals to assure compliance with contract documents before submittal to A/E.
- F. Review of Shop Drawings is final and no further changes shall be considered without written application. Shop Drawings review does not apply to quantities, nor relieve this HVAC Subcontractor or his subcontractors of their responsibility for furnishing materials or performing his work in full compliance with these Contract Drawings and Specifications. Review of these shop drawings shall not be considered a guarantee of the measurements of this building or the conditions encountered.

1.17 SUBSTITUTIONS

- A. Refer to, Section 013300 for requirements in requesting substitutions. The following paragraphs supplement the requirements of Section 013300.
- B. If materials or equipment are substituted for basis of design specified items that alter the systems shown or its physical characteristics, or which have different operating characteristics, clearly note the alterations or difference and call it to the attention of the Architect/Engineer. HVAC Subcontractor and his subcontractors shall be responsible for coordinating dimensional fit of equipment that varies from basis of design equipment. Under no circumstances shall substitutions be made unless material or equipment has been successfully operated for at least three consecutive years.
- C. Any modifications to the design, as a result of approving a substitution or equal from the basis of design equipment, shall be the responsibility of this HVAC subcontractor. Any additional cost to this HVAC subcontractor or any other contractor, directly or indirectly, as a result of such substitutions, shall be the responsibility of this HVAC subcontractor.

1.18 PRODUCT LISTING

- A. Prepare listing of major mechanical equipment and materials for the project.
- B. Provide all necessary information.
- C. Submit to the A/E through the General Contractor, within 20 days of signing contract, this listing indicating all equipment and manufacturers, as a part of the submittal requirement. If the product list is not submitted, it will be the responsibility of the HVAC sub-contractor to submit one of the three named equal manufacturers.
- D. When two or more items of same material or equipment are required they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in work, except as otherwise indicated.
- E. Provide products, which are compatible within systems and other connected items.

1.19 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, mode, number, serial number, capacity, operating, and power characteristics labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

1.20 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section General Conditions for delivery, storage, and handling of equipment. The following paragraphs supplement the requirements of Section General Conditions.
- B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
- C. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
- D. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.21 RECORD DOCUMENTS

- A. General: Refer to Section 017839 - RECORD DOCUMENTS, for general requirements for maintaining as-built drawings and submitting final reproducible record documents. The following paragraphs supplement the above.
- B. Provide Record Drawings for the Work of this Section and include the following: Provide electronic AutoCAD drawings and hard copy to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, balancing and control, dampers, isolation and control valves, and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column line; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located. Also provide ATC Drawings showing As-Built conditions, modified sequences, field changes and any additional items added through change orders, ASI & RFI.
- C. Refer to Section 017700 – CONTRACT CLOSEOUT and Section 017839 – PROJECT RECORD DOCUMENTS for additional requirements.

1.22 OPERATION AND MAINTENANCE DATA

- A. General: Refer to Section 017823 – OPERATION AND MAINTENANCE DATA for general requirements for submittal of operations and maintenance manuals, training of personnel and related closeout procedures. The following paragraphs supplement the requirements of Section 017839.

- B. In addition to the information required by Section 017823 for maintenance data, Closeout procedures specific to the Work of this Section include the following:
1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
 2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and user summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and trouble-shooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.
 5. Provide start-up reports for all major HVAC systems and equipment, including but not limited to, boilers, chiller, all air handling equipment, ductless cooling unit systems, pumps and fans.
 6. Provide DVD or USB storage drive of recording of operation and maintenance training sessions and include as part of Operation and Maintenance Manual submittal. Provide indexed table of contents for DVD recording.
 7. ATC Drawings/submittal of As-Built conditions.

1.23 WARRANTIES

- A. The HVAC subcontractor shall provide a one year minimum warrantee on all product (unless otherwise stated in the product specification for a specific product) and labor for work under this section. Refer to general conditions for additional warranty requirements.
- B. Refer to Section General Conditions and Section 017700 Project Closeout for additional procedures and submittal requirements for warranties.
- C. In addition to the one year warranty period against component and/or workmanship defects, 40 hours of training and 40 hours of extra programming as it relates to the control system and as indicated in section 230000 paragraph 2.15 and 3.15, the ATC Sub-subcontractor shall provide a seasonal site visit to confirm, verify and modify as required the sequence and/or programming of each piece of equipment to ensure the system is functioning as required and per the sequence of operations. The ATC Sub-subcontractor shall provide 16 labor hours per season (four times within a year, total of 64 hours). During each visit they shall, for each piece of equipment confirm operation and functionality, modify and/or repair any control related issues and/or programming and provide training as requested by the owner. This requirement will ensure the equipment/building is operating properly and efficiently as it cycles through each season. These seasonal site visits shall begin the following season after substantial completion of the project is issued. Upon substantial completion the engineer of record shall issue four dates to the ATC Sub-subcontractor and owner. Signatures and time logs will be kept by both parties to ensure these visits occur.

1.24 ENERGY REBATE PROGRAM

- A. This project has been designed to incorporate equipment approved for energy rebate such as boilers, high efficiency motors, rooftop units and condensing units. HVAC subcontractor shall review Utility Company requirements prior to submitting shop drawing to ascertain that submittal meets program guidelines. All submitted equipment shall meet utility company rebate program efficiency requirements. HVAC subcontractor shall furnish equipment submittals, related equipment/system pricing data and all required rebate application information, and forms to utility company.

1.25 HOISTING EQUIPMENT AND MACHINERY

- A. Unless otherwise specified, all hoisting and rigging equipment and machinery required for the proper and expeditious prosecution and progress of the Work of this Section shall be furnished, installed, operated and maintained in safe condition by each sub-contractor, as specified under Section 015000, TEMPORARY FACILITIES AND CONTROLS.

1.26 STAGING AND SCAFFOLDING

- A. Unless otherwise specified, each sub-contractor shall provide all lifts and man-lifts, and furnish, erect and maintain in safe condition, all staging and scaffolding as specified under Section 015000 Temporary Facilities and Controls as needed for proper execution of the work of this Section. Staging and scaffolding shall be of adequate design, erected and removed by experienced stage builders having all accident prevention devices required by Federal, state and local laws.

1.27 WELDING QUALIFICATIONS

- A. Piping shall be welded in accordance with qualifications procedures using performance qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPV IX. Welding procedures qualified by others, and welders and welding operations qualified by another employer may be accepted as permitted by ASME B31.1. The Owner's Representative shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practicable. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record. Structural members shall be welded in accordance with Division 01.
- B. When open-flame or spark producing tools such as welding equipment, and the like are required in the process of executing the work, the General Contractor shall be notified not less than twenty four hours in advance of the time that the work is to begin and the location where work is to be performed. Provide fire protective covering and maintain constant fire watch/fire detail (by the Southbridge Fire Department) where work is being performed and until it is completed. This HVAC subcontractor shall be responsible for obtaining required permit and paying all permit fees and Firewatch detail expenses.

1.28 TRADE RESPONSIBILITY FOR INTERCONNECTIONS MATRIX

Device	Furnished By	Installed By	Power Wiring	Control Wiring	Fire Alarm Wiring	Notes
Smoke Detectors (Area type)	26 00 00	26 00 00	26 00 00	23 00 00 (ATC)	26 00 00	
Smoke Detectors (Duct mounted)	26 00 00	23 00 00	26 00 00	23 00 00 (ATC)	26 00 00	
Smoke & Fire/Smoke Dampers	23 00 00	23 00 00	N/A	N/A	N/A	
Smoke & Fire/Smoke Damper Actuators	23 00 00	23 00 00	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	26 00 00	2
Fire Dampers	23 00 00	23 00 00	N/A	N/A	N/A	
VAV Boxes	23 00 00	23 00 00	26 00 00	23 00 00 (ATC)	N/A	2
VAV Box Damper Actuator	23 00 00 (ATC)	Box Mfr	23 00 00 (ATC)	23 00 00 (ATC)	N/A	2
VAV Box DDC Controller	23 00 00 (ATC)	Box Mfr	23 00 00 (ATC)	23 00 00 (ATC)	N/A	2
Hydronic Control Valves	23 00 00 (ATC)	23 00 00	N/A	23 00 00 (ATC)	N/A	1
Hydronic Control Valve Actuator	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	N/A	1
Sheet Metal Damper	23 00 00	23 00 00	N/A	N/A	N/A	1
Sheet Metal Damper Actuators	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	N/A	1
Natural Gas Energy Meters	22 00 00	22 00 00	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	N/A	3
Electrical Energy Meters	26 00 00	26 00 00	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	N/A	3
Domestic Water Meters	22 00 00	22 00 00	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	N/A	3
HVAC Hydronic Energy Meters	23 00 00	23 00 00 (ATC)	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	N/A	3
Airflow Measuring Stations	23 00 00 (ATC)	23 00 00 (ATC)	N/A	23 00 00 (ATC)	N/A	

Device	Furnished By	Installed By	Power Wiring	Control Wiring	Fire Alarm Wiring	Notes
DDC Panels	23 00 00 (ATC)	23 00 00 (ATC)	26 00 00 & 23 00 00 (ATC)	23 00 00 (ATC)	N/A	4
VFDs at AHU, EFs	23 00 00 (ATC)	23 00 00 (ATC)	26 00 00	23 00 00 (ATC)	N/A	
Elevator Hoistway Vent Damper	23 00 00	23 00 00	N/A	N/A	N/A	
Elevator Hoistway Vent Damper Actuator	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	23 00 00 (ATC)	26 00 00	
Boiler/DHW/Generator Breeching	22 00 00	22 00 00	N/A	N/A	N/A	
Kitchen Emergency Gas Valve	22 00 00	22 00 00	26 00 00	26 00 00	26 00 00	

Notes:

1. Division 23 00 00 and Division 23 00 00 (ATC) Contractors shall fully coordinate all airflow damper and hydronic valves sizes and quantities.
2. Smoke Damper and VAV Box power wiring shall be provided by Division 26 00 00 to junction box locations shown on electrical drawings; Division 23 00 00 (ATC) Contractor shall provide final power wiring from junction box to end device location.
3. Division 26 00 00 Contractor shall provide all line-voltage power wiring required for meters; Division 23 00 00 (ATC) Contractor shall provide all low-voltage power wiring required for meters.
4. Division 26 00 00 shall provide power at main DDC Panel. Division 23 00 00 (ATC) shall provide power to all other DDC Panels.

PART 2 - PRODUCTS

2.1 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

- A. Pursuant to Massachusetts General Laws Chapter 141, a Massachusetts Licensed electrician shall install all low voltage wiring required by this section.
- B. General: The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.
 1. All motors for all mechanical equipment shall be NEMA premium efficiency matching the following and all motors associated with variable frequencies drives shall be inverted duty motor with Aegis bearing protection rings:

HP	RPM	Efficiency
1	1800	85.5 percent
1.5	1800	86.5 percent
2	1800	86.5 percent

3	1800	89.5 percent
5	1800	89.5 percent
7.5	1800	91.0 percent
10	1800	91.7 percent
15	1800	93.0 percent
20	1800	93.0 percent
25	1800	93.6 percent
30	1800	94.1 percent
40	1800	94.1 percent
50	1800	94.5 percent

2. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
3. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
4. Temperature Rating: Rated for 40 degrees C. environment with maximum 50 degrees C temperature rise for continuous duty at full load (Class F Insulation). All ratings shall be for inverter duty applications.
5. Starting Capability: Frequency of starts as indicated by automatic control system and not less than five evenly time spaced starts per hour for manually controlled motors.
6. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.
7. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
8. Frames: NEMA Standard No. 48 or 54; use driven equipment manufacturer's standards to suit specific application.
9. Bearings:
 - a. Ball or roller bearings with inner and outer shaft seals.
 - b. Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance.
 - c. Designed to resist thrust loading where belt drivers or other drives produce lateral or axial thrust in motor.
 - d. For fractional horsepower, light duty motors, sleeve type bearings are permitted.
10. Enclosure Type:
 - a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
 - b. Guarded drip-proof motors where exposed to contact by employees or building occupants.
 - c. Weather protected Type I for outdoor use, Type II where not housed.
11. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
12. Noise Rating: "Quiet".
13. Efficiency: "Premium Efficient" motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, test method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, Test Method B.
14. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
15. Provide AEGIS magnetic bearing protection ring for all inverter rated motors that are controlled by variable speed drives. The bearing protection ring shall channel harmful shaft voltages to ground to protect bearing races from pitting.

- C. Starters, Electrical Devices, And Wiring: (Provided By The HVAC Subcontractor For Each Packaged Piece Of HVAC Equipment Requiring Such):
1. Motor Starter Characteristics:
 - a. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
 - b. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.
 2. Manual Switches shall have:
 - a. Pilot lights and extra position for multi-speed motors.
 - b. Overload Protection: Melting alloy type thermal overload relays.
 3. Magnetic Starters:
 - a. Maintained contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
 - b. Trip-free thermal overload relays, each phase.
 - c. Interlocks, pneumatic switches and similar devices as required for co-ordination with control requirements of Division 23 Controls Sections.
 - d. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
 - e. Externally operated manual reset.
 - f. Under-voltage release or protection.
 4. Capacitors:
 - a. Individual unit cells.
 - b. All welded steel housing.
 - c. Each capacitor internally fused.
 - d. Non-flammable synthetic liquid impregnant.
 - e. Craft tissue insulation.
 - f. Aluminum foil electrodes.
 - g. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors one horsepower and larger, that have an uncorrected power factor of less than 85 percent at rated load.
 5. Disconnect Switches:
 - a. Fusible Switches: Fused, each phase; general duty; horsepower rated; non-teasible quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "OPEN" position; arc quenchers; capacity and characteristics as indicated.
 - b. Non-fusible Switches: For equipment two horsepower and smaller, shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment larger than two horsepower, switches shall be the same as fusible type.

2.2 HANGERS & ATTACHMENTS (Refer to SECTION 230548 for Coordination)

A. Horizontal-Piping Hangers and Supports:

1. General: Except as otherwise indicated, provide factory-fabricated horizontal piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacture for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - a. Adjustable Steel Clevises Hangers: MSS Type 1.
 - b. Steel Pipe Clamps: MSS Type 4.
 - c. Pipe Slides and Slide Plates: MSS Type 35, including one of the following plate types:
 - 1) Plate: Unguided type.
 - 2) Plate: Guided type.
 - 3) Plate: Hold-down clamp type.
 - d. Pipe Saddle Supports: MSS Type 36, including steel pipe base-support and cast-iron floor flange.
 - e. Pipe Stanchion Saddles: MSS Tube 37, including steel pip base support and cast-iron floor flange.
 - f. Adjustable Pipe Saddle Supports: MSS Type 38, including steelpipe base support and cast-iron floor flange.
 - g. Single Pipe Rolls: MSS Type 41.
 - h. Adjustable Roller Hangers: MSS Type 43.
 - i. Pipe Roll Stands: MSS Type 44.
 - j. Pipe Rolls and Plates: MSS Type 45.
 - k. Adjustable Pipe Roll Stands: MSS Type 46.
2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - a. Carpenter and Patterson, Inc.
 - b. Corner & Lada Co., Inc.
 - c. Elcen Metal Products Co.
 - d. Fee & Mason Mfg. Co.; Div. Figgie International
 - e. ITT Grinnel Corp.
 - f. Or Equal.

B. Vertical-Piping Clamps:

1. General: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps, complying with MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
 - a. Two-Bolt Riser Clamps: MSS Type 8.
 - b. Four-Bolt Riser Clamps: MSS Type 42.

2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - a. Carpenter and Patterson, Inc.
 - b. Corner & Lada Co., Inc.
 - c. Elcen Metal Products Co.
 - d. Fee & Mason Mfg. Co.; Div. Figgie International
 - e. ITT Grinnel Corp.
 - f. Or Equal.
- C. Hanger-Rod Attachments:
1. General: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-pipe hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
 - a. Steel Turnbuckles: MSS Type 13.
 - b. Swivel Turnbuckles: MSS Type 15.
 - c. Malleable Iron Sockets: MSS Type 16.
 2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - a. Carpenter and Patterson, Inc.
 - b. Corner & Lada Co., Inc.
 - c. Elcen Metal Products Co.
 - d. Fee & Mason Mfg. Co.; Div. Figgie International
 - e. ITT Grinnel Corp.
 - f. Or Equal.
- D. Building Attachments:
1. General: Except as otherwise indicate, provide factory-fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.
 - a. Concrete Inserts: MSS Type 18.
 - b. Top Beam C-Clamp: MSS Type 19.
 - c. Side Beam or Channel Clamps: MSS Type 20.
 - d. Center Beam Clamps: MSS Type 21.
 - e. Welded Beam Attachments: MSS Type 22.
 - f. C-Clamps: MSS Type 23.
 - g. Top Beam Clamps: MSS Type 25.
 - h. Side Beam Clamps: MSS Type 27.
 - i. Steel Beam Clamps W/Eye Nut: MSS Type 28.
 - j. Linked Steel Clamps W/Eye Nut: MSS Type 29.
 - k. Malleable Beam Clamps: MSS Type 30.
 - l. Steel Brackets: One of the following for indicated loading:
 - 1) Light Duty: MSS Type 31.
 - 2) Medium Duty: MSS Type 32.
 - 3) Heavy Duty: MSS Type 33.

- m. Side Beam Brackets: MSS Type 34.
- n. Plate Lugs: MSS Type 57.
- o. Horizontal Travelers: MSS Type 58.
- 2. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - a. Carpenter and Patterson, Inc.
 - b. Corner & Lada Co., Inc.
 - c. Elcen Metal Products Co.
 - d. Fee & Mason Mfg. Co.; Div. Figgie International
 - e. ITT Grinnel Corp.
 - f. Or Equal.

E. Saddles and Shields:

- 1. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- 2. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
- 3. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.
- 4. Manufacturer: Subject to compliance with requirements, provide thermal hanger shields of one of the following:
 - a. Elcen Metal Products Co.
 - b. Pipe Shields, Inc.
 - c. Carpenter Patterson, Inc.
 - d. ITT Grinnel Corp.
 - e. Or Equal.

F. Miscellaneous Materials:

- 1. Metal Framing: Provide products complying with NEMA STD ML 1.
- 2. Steel Plates, Shapes, and Bars: Provide products complying with ASTM A 36.
- 3. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.
- 4. Heavy Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.
- 5. Pipe Guides: Provide factory-fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.3 MECHANICAL IDENTIFICATION

A. Plastic Pipe Markers:

- 1. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1

2. Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying with ANSI A13.1
 3. Insulation: Furnish 1 in. thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125 degrees F (52 degrees C) or greater. Cut length to extend 2 in. beyond each end of plastic pipe marker.
 4. Small Pipes: For external diameters less than 6 in. (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
 - a. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
 - b. Adhesive lap joint in pipe marker overlap.
 - c. Laminated or bonded application of pipe marker to pipe (or insulation).
 - d. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4 in. wide; full circle at both ends of pipe marker, tape lapped 1-1/2 in.
- B. Application: Provide pipe labels for the following piping system:
1. Heating Hot water supply and return.
 2. Refrigerant liquid and suction.
 3. Condensate drain.
- C. Valve Tags:
1. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4 in. high letters and sequenced valve numbers 1/2 in. high, and with 5/32 in. hole for fastener.
 - a. Provide 1-1/2 in. diameter tags, except as otherwise indicated.
 - b. Provide size and shape as specified or scheduled for each piping system.
 - c. Fill tag engraving with black enamel.
 2. Valve Tag Fasteners: Provide manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves, and manufactured specifically for that purpose.
- D. Valve Schedule Frames:
1. General: For each page of valve schedule, provide glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.
- E. Plastic Equipment Markers:
1. General: Provide manufacturer's standard laminated plastic, color-coded equipment markers. Conform to the following color code:
 - a. Green: Cooling equipment and components.
 - b. Yellow: Heating equipment and components.
 - c. Yellow/Green: Combination cooling and heating equipment and components.
 - d. Blue: Equipment and components that do not meet any of the above criteria.
 2. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - a. Equipment label "ID" from schedules.
 - b. Design capacity from schedules.
 3. Size: Provide approximate 2-1/2 in. x 6 in. markers for each piece of equipment.

4. Application: Provide equipment labels for the following equipment:
 - a. Boilers
 - b. Pumps
 - c. Expansion Tanks
 - d. Rooftop Units (RTU)
 - e. Variable Air Volume Boxes
 - f. Kitchen Make-Up Air Units (MAU)
 - g. Exhaust Fans
 - h. Terminal Heating Units HW/ELEC equipped with fans
 - i. Ductless Cooling Unit Systems
 - j. Air Separator

F. Ductwork Labels:

1. Provide painted stencils or standard laminated plastic, color coded labels for the following systems:
 - a. Supply Ductwork
 - b. Return Ductwork
 - c. Exhaust Ductwork
 - d. Hazardous Exhaust
 - e. Outside Air Ductwork
 - f. Grease Ductwork

2.4 MECHANICAL INSULATION

A. Piping Insulation Materials:

1. Fiberglass Piping Insulation: ASTM C 547, Class 45 required.
 - a. Class 1 for use to 450 degrees F; Class 2 for use to 650 degrees F; Class 3 for use to 1200 degrees F.
2. Flexible Unicellular Piping Insulation: ASTM C 534, Type as required.
 - a. Type I - tubular; Type II - sheet. For use between -40 degrees F and 200 degrees F.
3. Jackets for piping Insulation: ASTM C 921, ASTM C1136, ASTM E96/E96M, with vapor barrier for piping with temperatures below ambient.
4. Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers, fastened as per manufacturer's recommendations.
5. Encase straight pipe insulation, where exposed in occupied areas, with one piece 20-mil thick PVC Jacketing. Fasten and seal as per manufacturer's recommendations.
6. Encase exterior piping insulation with aluminum jacket with weather-proof construction.
7. Staples, Bands, Wires and Cement: As recommended by insulation manufacturer for applications indicated.
8. Adhesives, Sealants and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

B. Piping Insulation Application and Thickness:

1. Application: Cold Piping (40 Degrees F to Ambient):
 - a. Insulate the following cold HVAC piping systems:
 - 1) HVAC make-up water piping.
 - 2) Air conditioner condensate drain piping.
 - 3) Refrigerant liquid and suction piping.

- b. Insulate each piping system indicated above with the following type and thickness of insulation:
 - 1) Fiberglass: 1-1/2 in. thick for all pipe sizes.
 2. Application: Hot HVAC Piping (to 200 Degrees F)
 - a. Insulate the following hot HVAC piping systems
 - 1) HVAC hot water supply and return piping.
 - 2) Hot gas refrigerant piping.
 - b. Insulate each piping system indicated above with the following type and thickness of insulation:
 - 1) Fiberglass: 1-1/2 in. thick for pipe sizes up to and including 1 1/4 in, 2 in. thick for all 1 1/2 in. pipe and larger.
 - 2) Flexible Unicellular: (Refrigerant piping only) 1 in. thick.
 3. Insulation of Piping Exposed to Weather: Protect outdoor insulation from weather by installing outdoor protective finish aluminum jacketing installed as recommended by the manufacturer. Insulation thickness shall be increased by one size versus specified pipe insulation thickness. Provide UV protective PVC covering for all outdoor refrigerant piping. Fasten and install per manufactures instructions.
 - C. Ductwork Insulation Materials:
 1. Rigid Fiberglass Ductwork Insulation (R-8): ASTM C 612, Class as required.
CLASS 2 - 400 DEGREES F; 4 LBS./FT3.
CLASS 3 - 850 DEGREES F; 12 LBS./FT3.
CLASS 4 - 1000 DEGREES F; 12 LBS./FT3.
CLASS 5 - 1800 DEGREES F; 20 LBS./FT3.
 2. Flexible Fiberglass Ductwork Insulation (R-6): ASTM C 512, Class as required.
CLASS 2 - 400 DEGREES F; .75 LBS./FT3.
CLASS 3 - 850 DEGREES F; 1.5 LBS./FT3.
 3. Jackets for Ductwork Insulation: ASTM C 921, ATM C1136, ASTM E96/E96M, with vapor barrier.
 4. Ductwork Insulation Accessories: Provide staples, bands, wire, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
 5. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.
 - D. Ductwork Insulation Application and Thickness:
 1. Application: Ventilation and AC System Ductwork:
 - a. Insulate the following ductwork:
 - 1) Outdoor air ductwork between air entrance and air handling unit/boiler combustion air inlet.
 - 2) HVAC supply ductwork between HVAC unit discharge and room terminal connection.
 - 3) Insulate neck and bells of supply diffusers.
 - 4) HVAC return ductwork between room terminal inlet and HVAC unit inlet.

- 5) HVAC plenums and unit housing not pre-insulated at factory or lined.
 - 6) Exhaust ductwork between in-line exhaust fan and point of exit in building.
 - b. Insulate each ductwork system specified above with the following type and thickness of insulation:
 - 1) Rigid Fiberglass: In machine rooms, fan rooms, and mechanical spaces insulate all supply air, return air and outside air ductwork with 2 in. thick rigid (minimum R-8). All exposed outdoor ductwork in occupied areas shall be insulated internally with same thickness and material.
 - 2) Flexible Fiberglass: 2 in. thick (minimum R-6).
 - 3) All outside air ductwork shall be 3 in. rigid (R-8).
 2. Equipment Insulation Materials:
 3. Rigid Fiberglass Equipment Insulation (R-8): ASTM C 612, Class as required.
CLASS 2 - 400 DEGREES F; 12 LBS./FT3.
CLASS 3 - 850 DEGREES F; 12 LBS./FT3.
CLASS 4 - 1000 DEGREES F; 12 LBS./FT3.
CLASS 5 - 1800 DEGREES F; 20 LBS./FT3.
 4. Flexible fiberglass Equipment Insulation (R-6): ASTM C 553, Type and Class.
TYPE I - RESILIENT, FLEXIBLE;
CLASS B-1 - 0.65 LBS./FT3
CLASS B-2 - 0.75 LBS./FT3
CLASS B-3 - 1.00 LBS./FT3
CLASS B-4 - 1.50 LBS./FT3
CLASS B-5 - 2.00 LBS./FT3
CLASS B-6 - 3.00 LBS./FT3

TYPE II - FLEXIBLE; CLASS F-1 - 4.50 LBS./FT3
TYPE III - SEMIRIGID; CLASS F-2 - 4.50 LBS./FT3
 5. Flexible Unicellular Equipment Insulation: ASTM C 534, Type as required.
TYPE I - TUBULAR.
TYPE II - SHEET.
 6. Jacketing material for Equipment Insulation: Provide pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard, or metal jacket at Installer's option, except as otherwise indicated.
 7. Equipment Insulation Compounds; Provide adhesives, cements, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.
 8. Equipment Insulation Accessories: Provide staples, bands, wire, wire netting, tape, corner angles, anchors and stud pins as recommended by insulation manufacturer for applications indicated.
- E. Equipment Insulation Application and Thickness:
1. Application: Hot Equipment
 - a. Insulate the following:
 - 1) Expansion Tank
 - 2) Air Separators

- b. Insulate each item of equipment specified above with the following type and thickness of insulation:
 - 1) Fiberglass 2 in. thick.

2.5 GREASE DUCT INSULATION

A. MATERIAL

- 1. Thermal Material: 2192 degrees F rated core blanket, manufactured from patented bio-soluble Superwool chemistry (Calcium Magnesium Silicate).
 - a. Product: FireMaster FastWrap XL or Pyroscat Duct Wrap XL as manufactured by Thermal Ceramics.
 - b. Fully encapsulated thermal material in fiberglass reinforced aluminum/polypropylene scrim (FSP).
 - 1) Encapsulation FSP marked with UL Classification Mark.
 - 2) Encapsulation FSP marked with ICC-ES report number ESR 2213 or ESR 2832.
 - 3) Collars supplied in 6 in. (150 mm) wide by 25 ft.t (7620 mm) long rolls.
- 2. Product Characteristics:
 - a. Thickness: 1-1/2 in. (38 mm).
 - b. Nominal Density: 6 pcf.
 - c. R-Value: 7.35 per layer of FireMaster FastWrap XL or Pyroscat Duct Wrap XL when tested in accordance with ASTM C 518 at 75 F.
 - d. Flame Spread: <25 when tested in accordance with ASTM E 84.
 - e. Smoke Development: <50 when tested in accordance with ASTM E 84.
- 3. Manufactured round ductwork systems
 - a. Double wall with Zero clearance to combustible materials
 - b. Factory welded and Dye tested
 - c. ETL listed products
 - d. Manufacturers: Subject to Compliance of project specifications, manufactured kitchen exhaust systems shall be by:
 - 1) Captive Aire
 - 2) Metal Fab
 - 3) Or approved Equal.

B. ACCESSORY MATERIALS:

- 1. Glass Filament Tape: Minimum 3/4 in. (19 mm) wide - used to temporarily secure blanket until permanent attachment using steel banding and/or steel insulation pins.
- 2. Aluminum Foil Tape: Minimum 3 in. (76 mm) used to seal cut edges.
- 3. Carbon Steel or Stainless Strapping Material Minimum: 1/2 in. (13 mm) wide and 0.015 in. (.38 mm) thick
- 4. Steel Insulation Pins: Minimum 12-gauge, length sufficient to penetrate through duct wrap insulation.
- 5. Insulation Clips: Galvanized steel, minimum 1-1/2 in. (38 mm) round or square.
- 6. Through Penetration Firestop Sealants:
 - a. Packing Material: Remove encapsulation material from FireMaster FastWrap XL or Pyroscat Duct Wrap XL, use core blanket (white) as penetration packing material.

- b. Firestop sealants per applicable building code report and/or laboratory design listings.
- 7. Grease and HVAC Duct Access Doors:
 - a. Thermal Ceramics FastDoor XL Access doors; Supplied in standard door sizes of 6 by10 in. (152 mm by 254 mm), 8 by12 in. (203 mm by 305 mm), 12 by12 in. (305 mm by 305 mm) 12 by16 in. (305 mm by 406 mm), and 20 by20 in. (508 mm by 508 mm).

2.6 HYDRONIC PIPING AND ACCESSORIES

- A. Manufacturer: Subject to compliance with requirements, provide piping system products from one of the following:
 - 1. Grooved Mechanical Joint Pipe, Fittings and Couplings:
 - a. Victaulic Company of America.
 - b. Anvil Gruvlok
 - c. Grinnell
 - d. Or equal
 - 2. Pump Discharge Valves (Triple-Duty Valve):
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Armstrong Pumps, Inc.
 - d. Taco, Inc.
 - e. Victaulic (Tri-Service Assembly)
 - f. Or equal
 - 3. Safety Relief Valves:
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Spirax Sarco.
 - d. Watts Regulator Co.
 - e. Or equal
 - 4. Pressure Reducing Valves:
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Armstrong Pumps, Inc.
 - d. Taco, Inc.
 - e. Or equal
 - 5. Air Vents (Automatic):
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Armstrong Machine Works.
 - c. Hoffman Specialty ITT; Fluid Handling Div.
 - d. Spirax Sarco.
 - e. Or equal
 - 6. Air Separators:
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Armstrong Pumps, Inc.
 - d. Taco, Inc.
 - e. Or equal

7. Diaphragm-Type Compression Tanks:
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Armstrong Pumps, Inc.
 - d. Or equal
8. Pump Suction Diffusers:
 - a. Bell & Gossett ITT; Fluid Handling Div.
 - b. Amtrol, Inc.
 - c. Armstrong Pumps, Inc.
 - d. Taco, Inc.
 - e. Victaulic (style 731-D / W731-D)
 - f. Or equal
9. Chemical Feeder:
 - a. Dearborn USA.
 - b. Vulcan Laboratories, Subsidiary of Clow Corp.
 - c. York-Shipley, Inc.
 - d. Or equal
10. Basket Strainers:
 - a. Crane Co.
 - b. Metraflex Co.
 - c. Spirax Sarco.
 - d. Victaulic Company of America. (732/W732/730/W730)
 - e. Or equal

B. PIPE AND TUBING MATERIALS

1. Copper Tubing: ASTM grade B 88, Type L hard drawn temper copper tubing.
2. Copper Tubing: ASMT grade B 88, Type K, annealed copper tubing.
3. Steel Pipe: ASTM A-53 grade B, Schedule 40, seamless, black steel pipe, beveled ends.
4. CPVC Plastic Pipe: ASTM D 2846, Chlorinated Poly (Vinyl Chloride) (CPVC) pipe.

C. FITTINGS

1. Cast-Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B2.1.
2. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B2.1.
3. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.
4. Grooved Mechanical Fittings: ASTM A 106, or ASTM A 53/A53M, Type F, E or S, Grade B fabricated steel, or ASTM A 234, Grade WPB forged steel fittings with grooves or shoulders designed to accept grooved end couplings.
5. Grooved Rigid Mechanical Couplings: Consist of a two- piece ductile iron housing per ASTM A536, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
 - a. Rigid Couplings:
 - 1) Housings 12" and smaller cast with offsetting angled-pattern bolt pads to provide visual confirmation upon metal-to-metal pad contact with no torque requirement. Victaulic Style 107H and Style 07 or equal. Designs that permit spaces at bolt pads or require a torque per manufacturer's written installation instructions not permitted

- 2) Housings 14" and larger cast with wedge-shaped groove profile, lead-in chamfer and flat pad design for metal-to-metal pad contact. Victaulic Style W07 or equal.
- b. Flexible Couplings:
 - 1) Use in locations where vibration attenuation and stress relief are required. Victaulic Style 177, 77 or W77 or equal. Three flexible couplings may be used in lieu of each flexible connector for vibration attenuation. Couplings shall be placed in close proximity to the vibrating source in accordance with published guidelines.
- c. Flange Adapters: Ductile iron housing, flat face, for use with grooved end pipe and fittings, for mating directly with ANSI Class 125, 150, and 300 flanges. Victaulic Style 741, 743 or W741 or equal.
6. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.
7. CPVC Plastic Fittings: ASTM D 2846, Chlorinated Poly Vinyl Chloride (CPVC) socket-type fittings and solvent for solvent cemented joints.
8. Cast-Iron Threaded Flanges: ANSI B16.1, Class 125; raised ground face, bolt holes spot faced.
9. Cast Bronze Flanges: ANSI B16.24, Class 150; raised ground face, bolt holes spot faced.
10. Steel Flanges and Flanged Fittings: ANSI B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:
 - a. Material Group: 1.1.
 - b. End Connections: Butt Welding.
 - c. Facings: Raised face.
11. Solder Filler Metals: ASTM B 32, 50-50, Tin-Lead, for condenser water, chilled water, and make-up water and drain piping.
12. Solder Filler Metals: ASTM B 32, 95-5 Tin-Antimony, for heating hot water and low pressure steam piping.
13. Brazing Filler Metals: AWS A5.8.
14. Gasket Material: EPDM Thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.
15. Flexible Connectors: Stainless steel bellows with woven flexible bronze wire reinforcing protective jacket; minimum 150 psig working pressure, maximum 250° F. operating temperature. Connectors shall have flanged, grooved or threaded end connections to match equipment connected; and shall be capable of 3/4" misalignment.
 - a. Three (3) flexible couplings may be used in lieu of each flexible connector for vibration attenuation. Couplings shall be placed in close proximity to the vibrating source in accordance with published guidelines.

D. PIPE SLEEVES AND ESCUTCHEONS

1. General: Provide schedule 40 black steel or 18 gage galvanized pipe sleeve large enough to accept pipe along with specified pipe insulation at each point where pipe penetrates a wall or floor. Sleeve shall be large enough to allow for free movement of pipe however minimized to prevent leakage of smoke and fire during a fire emergency. For all piping exposed to view provide a chrome plated escutcheon that will surround insulation where applicable on pipe for a neat finished appearance. Where piping is concealed above ceilings no escutcheons are required.

E. SPECIAL DUTY VALVES

1. General: General duty valves (i.e., gate, check, ball, and butterfly valves) are specified in Division 23 Section "Valves" Special duty valves are specified in this Article by their generic name; refer to the drawings for specific applications of these valves.
2. Pump Discharge Valves (Triple-Duty Valve): 175 PSIG working pressure, 300° F. maximum operating temperature, cast-iron body, bronze disc and seat, stainless steel stem and spring, and "Teflon" packing. Valves shall have flanged connections and straight or angle pattern as indicated. Features shall include non-slam check valve with spring-loaded weighted disc, and calibrated adjustment feature to permit regulation of pump discharge flow and shutoff.
 - a. In grooved installations, Tri-Service Assemblies may be used in lieu of Triple-Duty Valves. Straight pattern, (300-psi) pressure rating, combination shut-off, throttling, and non-slam check service in one unit. Victaulic Vic®-300 MasterSeal™ or equal, butterfly valve assembled with Series 779 Venturi Check valve or equal, with flow measurement capabilities and Victaulic or equal couplings (style to be determined by system requirements) for 2" through 12". Straight pattern, 230-psig pressure rating combination shut-off, throttling, and non-slam check service in one unit. Victaulic AGS-300 or equal butterfly valve assembled with Series W715 or equal check valve and Victaulic or equal couplings for 14" and larger.
3. Pressure Reducing Valves: Diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and non-corrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment.
4. Safety Relief Valves: 125 psig working pressure and 250° F. maximum operating temperature: designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber. Select valve to suit actual system pressure and BTU capacity.
5. Combined Pressure/Temperature Relief Valves: Diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and non-corrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment. Safety relief valve designed, manufactured, tested, and labeled in accordance with the requirements of Section IV of the ASME Boiler and Pressure Vessel Code. Valve body shall be cast-iron, with all wetted internal working parts made of brass and rubber; 125 psig working pressure and 250° F. maximum operating temperature. Select valve to suit actual system pressure and BTU capacity. Provide with fast fill feature for filling hydronic system.

F. HYDRONIC SPECIALTIES:

1. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240° F. operating temperature; and having 1/4" discharge connection and 1/2" inlet connection.

2. Diaphragm-Type Compression Tanks: Size and number as indicated; construct of welded carbon steel for 125 psig working pressure, 375° F. maximum operating temperature. Separate air charge from flexible diaphragm securely sealed into tank. Provide taps for pressure gage and air charging fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Tank, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME Pressure Vessel Code, Section VIII, Division 01.
3. Pump Suction Diffusers: Cast-iron or ductile iron body, with threaded connections for 2" and smaller, flanged or grooved connections for 2-1/2" and larger; 175 psig working pressure, 300° F. maximum operating temperature for flanged and 300 psig working pressure, 230F for grooved; and complete with the following features:
 - a. Inlet vanes with length 2-1/2 times pump suction diameter or greater.
 - b. Cylinder strainer with 3/16" diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head.
 - c. Disposable fine mesh strainer to fit over cylinder strainer.
 - d. Permanent magnet, located in flow stream, removable for cleaning.
 - e. Adjustable foot support, designed to carry weight of suction piping.
 - f. Blowdown tapping in bottom; gage tapping in side.
4. Chemical Feeder: Bypass type chemical feeders of 5 gallon capacity, welded steel construction; 125 psig working pressure; complete with fill funnel and inlet, outlet, and drain valves.
5. Chemical Treatment
 - a. Furnish the necessary apparatus to provide water treatment to the hot water piping systems as well as the boilers as furnished by New England Systems and Supply, Inc., GE Betz Water Technologies, or other fully capable water treatment organization approved by the Engineer.
 - b. A contract agreement satisfactory in form and substance shall be executed between this HVAC subcontractor and water treatment company to furnish supervisory service to assure the use of the proper chemical treatment thereof. The water treatment company shall perform the following specified services through its agent:
 - 1) Supervise the cleaning and flushing of all systems and the initial introduction of water treatment chemicals.
 - 2) Furnish all required chemicals for the cleaning and proper initial treatment of all systems hereinafter described, together with all necessary testing equipment and reagents for field analysis of the water.
 - 3) Submit a written report of test results of the field analyses to the Engineer when the systems are cleaned and treated with corrosion inhibitors. Submit certificate of completion for all systems indicating that all treatment systems are properly functioning and that the associated systems are properly treated.
 - c. The hot water piping system shall be cleaned with sufficient chemicals to ensure the removal of all cutting oil, compound, etc. These chemicals shall not be harmful to the various materials of the systems. The treatment company representative shall supervise this operation including the flushing of the system and shall test the final rinsed system to ensure that the remnants of the cleaning solution do not impart alkalinity to the water in excess of 300 PPM.

- d. Hot water systems shall be treated with sufficient amounts of the proper chemicals to conform to the Dianodic method for corrosion protection. Take various samples of water to assure proper level of chemical treatment.
- e. Each boiler shall be treated with sufficient amounts of the proper chemicals to provide positive protection against corrosion, scale formation and carry over.
- f. At the end of the first year of the contract agreement, the chemical treatment company shall provide to the owner and copy to Architect, a log of type, quantity and dosage of treatment and test results of treatment performed through the first year.
- g. Following the first year of service, chemical treatment company shall provide recommended maintenance and treatment schedule to owner and a copy to architect for testing and treating the water. This schedule shall be posted in the boiler room along with the testing and treatment log.
- h. Upon completion of first year of service, the chemical treatment company shall instruct the owner to the owner's responsibility to test and treat water or to contract with chemical treatment company to perform testing and treatment services.
- 6. Y-Pattern Strainers: Cast-iron body (ASTM A 126, Class B), flanged ends for 2-1/2" and larger, threaded connections for 2" and smaller, bolted cover, perforated Type 304 stainless steel basket, bottom drain connections; 125 psig working pressure.
- 7. Basket Strainers: High tensile cast-iron body (ASTM A 126, Class B), flanged end connections, bolted cover, perforated Type 304 stainless steel basket, bottom drain connections; 125 psig working pressure.
- 8. Grooved-End Strainers:
 - a. Y-Pattern: Ductile iron body ASTM A536, grooved ends for 2" and larger, coupled cover, perforated Type 304 stainless steel basket, bottom drain, 300 psig working pressure.
 - b. T-Pattern: Ductile iron body ASTM A536, grooved ends for 2" and larger, coupled or T-bolt hinged cover, perforated 304 stainless steel basket, bottom drain, up to 750 psig working pressure.
- 9. Grooved-End Expansion for Steel Piping 2" and larger (Water Service):
 - a. 2" Through 6": Packless, gasketed, slip-type expansion joint with grooved end telescoping body for installation with Victaulic Style 107 or 07 rigid couplings. Provides axial end movement to 3", designed for water services up to 230°F and working pressure to 350 psi. Victaulic Style 150 Mover®.
 - b. 2" Through 24": Combination of short nipples and Victaulic Style 177 or 77 flexible couplings joined in tandem for increased expansion. Joint movement and expansion capabilities dependent on number of couplings/nipples used in the joint. Pressure rating dependent on size and style of flexible couplings used. Victaulic Style 155.
 - c. Expansion Loops: Pipe bends and loops in grooved piping systems shall consist of (8) Victaulic Style 177, 77 or W77 flexible couplings, (4) Victaulic 90° elbows, and (3) grooved end pipe spools provided in water systems to +250°F in accordance with the latest Victaulic recommendations for expansion compensation. Rigid couplings shall not be used on loop corners.
 - d. Expansion Joints: Provide pipe expansion joints at all building expansion joints. Utilize a seismic expansion fitting similar to Metra-Flex, Metra Loop Grooved ends or equal. The expansion fitting shall provide absorbtion in the lateral offset and angular movement.

10. AIR and DIRT SEPARATORS - Air and dirt removal device shall be constructed of steel. It shall be designed, fabricated and stamped per ASME Section VIII Division 1 with a maximum working pressure of 125 psi at 270°F. Manufacturer shall be holder of ASME U stamp. Manufacturer to have optional 250 psi and 150 psi ASME units available. Units up to three 3-inch in size shall be provided with threaded connections as standard. Units four 4-inch and larger shall be provided with flanged system connections as standard. Inlet and outlet connections to be inline with piping system. Both inlet and outlet to be in the same horizontal and vertical planes. Each air and dirt removal device shall be equipped with a brass conical shaped air venting chamber designed to minimize system fluid from fouling the venting assembly. The air vent shall be able to be closed to allow flushing and purging of dirt via side port without dirt passing through vent on initial system fill. A brass flushing cock shall be located on the side of each separator to facilitate system fast-fill and removal of the floating impurities from the air system interface within the separator. A blow down valve shall be provided by the unit manufacturer on the bottom of each unit to allow blow down and cleaning. On units 2 ½" and smaller the valve and all of its fittings shall be 1". On units three 3" and larger the valve and all openings shall be 2".
11. Flexible Expansion Loop (seismic applications):
 - a. All equipment, either rigidly mounted or mounted on vibration isolators, shall be attached to the piping system using flexible loops designed for seismic movement. Flexible loops shall be capable of movement in the X, Y, and Z planes and must completely isolate the equipment from the piping.
 - b. All piping passing through building seismic joints shall contain a flexible expansion loop designed for seismic movement. Flexible loops shall be located at, or near the building seismic joint. A vertical support hanger, located within 4 pipe diameters, shall be installed on each side of the flexible loop. Each hanger to be transversely and longitudinally braced per local codes. Seismic bracing shall not pass through building seismic joint and shall not connect or tie together different sides or parts of building structure. Flexible loops shall be capable of move in the X, Y, and Z planes.
 - c. Flexible loops attached to fuel gas lines, shall be specifically manufactured for fuel gas applications and certified by the American Gas Association. Flexible loops connected to medical gas piping shall be specifically manufactured for medical gas and installed by a certified installer. Unless specified otherwise by system design engineer or governing codes, all flexible loop connections to medical gas piping shall be cleaned, installed, inspected, and tested in accordance with current NFPA-99 standards.
 - d. Flexible expansion/seismic loops shall consist of two flexible sections of hose and braid, two 90 elbows, and a 180 return assembled in such a way that the piping does not change direction, but maintains its course along a single axis. Flexible loops shall have a factory supplied, center support nut located at the bottom of the 180 return, and a drain/air release plug. Flexible loops shall impart no thrust loads to system support anchors or building structure. Flexible loops may be installed to accommodate both thermal and seismic motion. For steam service, loops must be installed with flexible legs horizontal to prevent condensate buildup. Materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings. Movement capabilities and location, relative to seismic separation, shall be determined manufacturers recommendations.
 - e. Flexible expansion/seismic loops to be Metraloop(r) or approved equal

2.7 KITCHEN GAS FIRED MAKE-UP AIR UNIT (MAU)

- A. Unit shall be capable of gas heating.
- B. Gas Train and Controls: Indirect fired gas system shall have a draw through design, field adjustable burner baffles and Maxon type NP burner for optimal burning efficiency. Flame safeguard shall be Honeywell 7800 series with digital coded fault indicator capability. Fault indicator shall provide service history by storing codes for the last five faults. Safety shutoff valves shall be industrial duty and use 120 VAC control signals. Temperature control shall incorporate an electronic modulation control system.
- C. Unit Casing and Frames: Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable or hinged doors.
- D. Insulation: Unit casing to be lined with 1 in. fiberglass insulation. Insulation in accordance with NFPA 90A and tested to meet UL 181 erosion requirements and secured to unit with waterproof adhesive and permanent mechanical fasteners.
- E. Fan Section: Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be statically and dynamically balanced. Ground and polished steel shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 or larger). Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.
- F. Heat Exchanger: The heat exchanger shall be heavy-duty stainless steel with airfoil contoured die-formed tubes, individually removable aluminized steel burner with stainless steel ribbons and cross lighter, pilot assembly, and slide out burner tray. Burner shall also include a balanced flue design, gravity venting system for operation with either natural or LP gas at the inlet pressure indicated on the schedule. Each furnace shall be constructed with an aluminized steel casing with baked on enamel finish. Standard controls shall include a main gas pressure regulator, main modulating gas valve with 10 to 1 turndown, spark ignition, safety pilot, high limit, and 24 V control transformer. Electric ignition, standing pilots lights are unacceptable.
- G. Motors and Drives: Motors shall be VFD rated energy efficient, with Aegis magnetic bearing protection rings complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150 percent of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

- H. Electrical: All internal electrical components shall be pre-wired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include control circuit fusing, control transformer for 120 VAC circuit, integral door interlocking disconnect switch with separate motor fusing and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard. Division 260000 shall furnish and install the variable frequency drive.
- I. Filter Mixing Box: Filters shall be 2 in. MERV 13 mounted in a V-bank arrangement such that velocities across the filters do not exceed 550.0 ft. per minute. Filters shall be accessible through a removable access panel. Filter quantities shall be provided as indicated in Part III. Filter mixing box section shall be provided with factory mounted low leak hollow core air foil blades, outside air and return air dampers. Dampers shall be constructed of galvanized steel in galvanized frame. Dampers shall be fully gasketed and have continuous vinyl seals between damper blades with stainless steel seals along the end of the dampers. The leakage rate shall be less than two tenths of one percent at 2 inch sp. differential tested in accordance with AMCA standard 500.
- J. Temperature Controls are to be furnished and installed by the ATC Sub-subcontractor. Unit manufacturer shall provide terminal strips control devices not furnished by ATC Sub-subcontractor, including modulating gas valve. Refer to Specification Section 230000 ATC control specification requirements and Control Diagram Drawings for Rooftop unit control requirements and expanded sequence of operation and required points list. HVAC and ATC Sub-subcontractors shall coordinate with unit manufacturer to ensure all sequence of operation and control points are achieved with the BMS to complete the specified sequence of operation and points lists.
- K. Weather Hood: Weather hood shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.
- L. Manufacturer: Subject to compliance with the above, provide Kitchen Make-Up Air Unit of one of the following:
 - 1. Greenheck
 - 2. Cook
 - 3. Captive Aire
 - 4. Or Approved Equal.

2.8 POWER AND GRAVITY VENTILATORS

- A. General: Except as otherwise indicated, provide standard prefabricated power and gravity ventilator units of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation.
- B. Refer to Division 23 automatic temperature control for control sequence.
- C. Roof Fans (EF)
 - 1. Type: Centrifugal fan, direct or belt driven as scheduled. Provide aluminum, or galvanized steel, weatherproof housings as scheduled. Provide square base to suit roof curb. Provide permanent split-capacitor type motor for direct driven fans; capacitor-start, induction-run type motor for belt driven fans.

2. Electrical: Provide factory-wired non-fusible type disconnect switch at motor in fan housing. Provide thermal overload protection in fan motor. Provide conduit chase within unit for electrical connection.
3. Bird Screens: Provide removable bird screens, ½ in. mesh, 16-ga. aluminum or brass wire.
4. Motor Operated Dampers: Provide louvered dampers with linkage below curb base (maximum of 6 in.). Provide hinged curb access with restraint cable for service.
5. Finish: Provide two coat 70 percent Kynar/Hylar finish in color selected by Architect. Dry film thickness shall be 1.23 mil. Provide 10 year finish warranty. Submit color selection chart to Architect as part of submittal package.
6. Manufacturer: Subject to compliance with requirements, provide centrifugal roof ventilators of one of the following:
 - a. Captive Aire
 - b. Cook Co., Loren.
 - c. Greenheck Fan Corp.
 - d. Penn Ventilator Co., Inc.
 - e. Power Line Fans; Div. of Torin Corp.
 - f. Twin City
 - g. Or equal

D. Prefabricated Roof Curbs

1. Manufacturer of ventilating unit shall provide his standard 18 in. high roof curb compatible with unit being provided. Curb shall be insulated and sloped to allow for level installation of device. Provide all necessary nailers, and cants for a complete installation.

E. CENTRIFUGAL IN-LINE FANS (EF)

1. General: Fans shall be of the centrifugal belt or direct driven in-line type. Units shall bear AMCA label.
2. Fan Housing: Shall be of the square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars. Unit shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.
3. Fan Wheel: Shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
4. Motors: Shall be heavy duty ball bearing type, carefully matched to the fan load and furnished at the specified voltage, phase, and enclosure. Motors and drives shall be mounted out of the airstream. Motors shall be readily accessible for maintenance.
5. Shafts and Drives: Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing. A NEMA 1 disconnect switch shall be provided, factory wired.
6. Manufacturer: Subject to compliance with requirements, provide centrifugal in-line fans of one of the following:
 - a. Cook Co., Loren.
 - b. Greenheck Fan Corp.
 - c. Captive Aire

- d. Twin City
- e. Or equal

F. Prefabricated Roof Curbs

1. Manufacturer of ventilating unit shall provide his standard 18 in. high roof curb compatible with unit being provided. Curb shall be insulated and sloped to allow for level installation of device. Provide all necessary nailers, and cants for a complete installation.
2. Manufacturer: Subject to compliance with requirements, provide centrifugal in-line fans of one of the following:
 - a. Greenheck Fan Corp.
 - b. Cook Co., Loren.
 - c. Captive Aire
 - d. Twin City
 - e. Or equal

2.9 METAL DUCTWORK

- 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:

Standard	As Applicable To:
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
SMACNA Fibrous Glass Duct Construction Standards	Fibrous Glass Ductwork; Tapes
SMACNA Thermaoplastic Duct (PVC) Construction Manual	PVC Ductwork
ADC and TIMA Flexible Duct Performance Standards	Flexible Ductwork
NFPA 96	Kitchen Hood Exhaust Ductwork
NFPA 45	Laboratories using chemicals
SMACNA Guidelines for Welding Sheet Metal	Welded Galvanized, Black Iron and Stainless Steel Ductwork

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 re route 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 CONSTRUCT -ION CLASS	STATIC PRESSURE RATING	PRESSURE	SMACNA SEAL CLASS	SMACNA LEAKAGE CLASS	VELOCITY
4"	4"	Pos.*	A	3	4000 fpm or less
3"	3"	Pos. or Neg.	A	3	4000 fpm or less
2"	2"	Pos. or Neg.	A	6	2500 fpm or less
1"	1"	Pos. or Neg.	A	6	2500 fpm or less
½"	½"	Pos. or Neg.	A	6	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.

7. Ductwork shall have pressure velocity classifications as follow:

DUCT CONSTRUCT -ION CLASS	STATIC PRESSURE RATING	PRESSURE	SMACNA SEAL CLASS	SMACNA LEAKAGE CLASS	VELOCITY
4"	4"	Pos.*	A	6	4000 fpm or less
3"	3"	Pos. or Neg.	A	6	4000 fpm or less

DUCT CONSTRUCT- ION CLASS	STATIC PRESSURE RATING	PRESSURE	SMACNA SEAL CLASS	SMACNA LEAKAGE CLASS	VELOCITY
2"	2"	Pos. or Neg.	B	12	2500 fpm or less
1"	1"	Pos. or Neg.	B	12	2500 fpm or less
½"	½"	Pos. or Neg.	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 construction class & 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 displacement diffusers and variable air volume boxes.
 - 2) 3" Class: All kitchen hood exhaust ductwork, all return ductwork, janitors room exhaust and kiln exhaust.
 - 3) 2" Class: All other ductwork.
8. Sealing Requirements for Class A, Leakage Class 3, 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. After sealant has cured, seal entire joint with Hardcast Inc. RTA-50 adhesive on to Hardcast Inc. DT tape or approved equal.
 - 2) Seal all non-flanged transverse joints with Hardcast Inc. RTA-50 adhesive on to Hardcast Inc. DT tape 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.
 - 2) Note, access doors and damper rod penetrations shall be equipped with proper hardware for sealing.
9. 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.
- 10. 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.
- 11. 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.
- 12. 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.
- 13. 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.
- 14. 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.

15. 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.
16. 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:

Elbow Angle	No. of Gores
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.
17. 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.
18. Extractors shall have adjusting rod and locknut on outside of duct.

19. Connections to roof fans:
 - a. Shall be at least 22 ga. galvanized steel soldered watertight.
 - b. Solder side seams at least 12" up from bottom.
 - c. Provide suitable dielectric gaskets to join dissimilar materials.
20. Plenums and connections to louvers:
 - a. Shall be 18 ga. 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 corrosible 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 water tight; insulated with 2" thick 6 lb. density rigid or board insulation.
21. Duct Pressure Tests
 - a. Pressure test all duct classes after takeoffs and wall penetrations are in place and before applying exterior insulation. Correct any leaks.
 - b. Pressure and leak test 100% of all ductwork with a pressure class of 3" and higher as specified in paragraph 2.18.B.7.a. Duct shall be constructed so there is no joint or structural failure at the test pressure.
22. Duct Leakage Tests
 - a. Leak testing method shall be performed as outlined in the SMACNA HVAC Air Duct Leakage Test Manual. As specified in paragraph 2.18.B.7 & a, utilize Sealing Requirements for Class A and Leakage Class 6. 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.
23. 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 for dishwashers and locker rooms 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. 2" and Lower Pressure Class Ductwork, Rectangular:
- 1. Ducts wider than 19" with more than 10 square feet of unbraced panel shall be beaded or cross broken.
 - 2. Internal stiffening struts shall only be used upon prior written approval of the Designer.
 - 3. Make changes in duct size with tapered connections as required by SMACNA. Changes shall NOT exceed 30° from line of air flow. Take off to the diffusers shall be 45° leading edge type or Bellmouth type.
 - 4. Transverse joints shall be TDF/TDC or slip joints; use flat or standing seam according to SMACNA. Where duct size requires standing seam but space restrictions dictate flat seam, notify Designer prior to fabrication.
- D. 2" and Lower Pressure Class Ductwork, Round:
- 1. Joints
 - a. Longitudinal joints shall be spiral seam, butt welded, lap and seam welded, or ACME lock grooved seam. Snap lock seams shall be used on 1/2" w.g. pressure class duct only.
 - b. Transverse joints shall be beaded sleeve joint. Other approved joints listed in SMACNA may be used if approved by engineer. Use a min of three or more sheet metal screws at 15" uniform intervals along circumference of joints.
 - 2. Branch fittings shall be conical tee (Buckley or equal) or combination tee as shown in SMACNA.

- E. 3" and 4" Pressure Class Ductwork Rectangular
 - 1. Joints
 - a. Joints shall be prefabricated type by TDC, TDF or Ductmate. See Prefabricated Joints paragraph for specific requirements.
 - 2. Duct reinforcement spacing and type shall comply with SMACNA.
 - 3. Ductwork on both sides of transitions shall be run in same horizontal axis.
 - 4. Diverging section slope shall be 1 1/2" per foot or less if possible.
 - 5. Contraction section slope shall not exceed 7" per foot.
 - 6. Takeoffs shall be 45° leading edge type except that Bellmouths (Buckley or equal) may be used for takeoffs to terminal boxes if the distance between the box and point of takeoff is less than 8 ft.
 - 7. Ducts with an aspect ratio greater than 3:1 shall be minimum of 18 gauge unless a thicker gauge is required by SMACNA.
- F. 3" and 4" Pressure Class Ductwork, Flat Oval, Single Wall
 - 1. Joints
 - a. Ducts shall have spiral lock seams or longitudinal seams. Seams and joints in fittings shall be continuously welded. If coating is damaged during welding, repair joints to prevent corrosion.
 - b. Transverse joints shall be slip. Other approved joints listed in SMACNA may be used if approved by engineer.
- G. 3" and 4" Pressure Class Ductwork, Round, Single Wall
 - 1. Joints
 - a. Longitudinal seams shall be lock spiral, lock longitudinal or butt welded longitudinal.
 - b. Transverse joints shall be slip joints. Draw band joints shall be used on longitudinal seam duct only. Other approved joints listed in SMACNA may be used if approved by engineer.
 - c. Seams and joints in fittings shall be continuously welded. If coating is damaged during welding, repair joints to prevent corrosion.
 - 2. Branch fittings shall be conical tee or combination tee as detailed in SMACNA.
- H. Double Wall Ductwork
 - 1. Duct and fitting shall be United Sheet Metal Co., Acousti K27, type P or equal consisting of:
 - a. External pressure tight shell of zinc coated steel.
 - b. Uniformly packed, 1-1/2" layer of fire resistant fibrous glass acoustic insulation with R-6 value with mylar or foil liner meeting 25/50 flame spread/smoke developed rating.
 - c. Internal perforated protective metal liner of zinc coated steel, with holes sized and spaced to give acoustic impedance of noise reduction characteristic of Acousti K27 duct.

2. Pressure shell of round duct shall be United or approved equal spiral pipe and pressure shell of fittings shall be zinc coated steel, as follows:

Item	Size	Gauge of Pressure Shell
Duct	3" to 6"	26
	7" to 20"	24
	21" to 34"	22
	36" to 48"	20
	50" to 60"	18
Fitting	3" to 34"	20
	36" to 48"	18

3. Fittings shall be continuous, corrosion resistant welds made by certified welders.
4. Joints between straight duct sections and joints between duct and fittings shall be made with pre fabricated couplings with 4" shoulder inserted into duct and sealed with internal duct sealant and tek screws a min of every 6".

I. Flexible Rigid Duct

1. Flexible ductwork shall be Flexmaster Triple Lock Buck Duct Flexible Air Duct (insulated) as manufactured by Buckley Associates or equal (617 878 5000). Flexible duct, non insulated, shall be Underwriters Laboratory Listed UL 181 Class 0 air duct and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.
2. Duct shall be made from a tape of dead soft aluminum sheet, spiral wound into a tube and spiral corrugated to provide strength and stability. The joint shall consist of a triple lock mechanically performed without the use of adhesives to make a durable airtight seam. A double lock is not acceptable.
3. Flexible duct connected to insulated or lined duct shall also be insulated. Flexmaster insulated flex shall have a gray Fire Retardant Polyethylene outer jacket with a ½ lb. density, 1 1/2" thick fiberglass insulation blanket, factory wrapped. Flexible Duct, insulated, shall be Underwriters Laboratory Listed and constructed in accordance with NFPA standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.
4. The flexible duct shall be supported as required.
5. Flexible duct work shall be rated at 12" positive pressure. Duct from 3 to 16" shall have a negative pressure of 12", 8" for duct work 18 and 20.
6. All flexible duct shall be individually cartoned and labeled for delivery to the job site for maximum protection.
7. Submittals shall include data on minimum thickness of aluminum core, in addition to other data listed above, required to ensure that submitted product meets the requirements of these specifications.
8. Provide sealing compound for installation. See further paragraphs in this specification and details for other installation requirements.

- J. Thermoplastic Ductwork (PVC)
1. PVC duct installation shall be as recommended by SMACNA Thermoplastic (PVC) Duct Construction Manual.
 2. Butt weld longitudinal and transverse joints with hot gas filter rod welding. Rods shall be compatible with material specified for duct. Stagger longitudinal seams. Weld transverse seams on 8 foot centers.
 3. Taper transition pieces 5" in length for each 1" change in diameter.
 4. Provide welded 4" wide reinforcing sleeve straps where recommended by SMACNA.
 5. Provide expansion joints where recommended and as specified by SMACNA.
 6. Provide suitable hangers and supports on eight foot centers that coincide with transverse joints as recommended by SMACNA.
- K. 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 HVAC subcontractor.
 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.
- L. 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.

- M. Locker Room Exhaust or Return Ductwork
 - 1. Ductwork shall be aluminum, of types as detailed in this specification above and constructed in accordance with SMACNA except that Seal Class shall be "A" regardless of duct pressure rating.
- N. Branch Duct Take off Fittings
 - 1. HVAC Subcontractor 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 HVAC subcontractor 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 air tight Neoprene gasket to ensure a tight fitting with minimal leakage. Pre drilled 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.
- O. Double Wall Grease Duct
 - 1. Double Wall Kitchen Exhaust Ductwork
 - a. Listed and complies with safety standards UL1978, UL2221, CAN/ULC-S144 and testing has been extended to recognize ASTM E2336 and AC101 due to similar testing criteria.
 - b. When installed in accordance with these instructions and National Fire Protection Association "NFPA 96"; Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
 - c. UL 2221: Standard for Fire Resistive Grease Duct Enclosure Assemblies. Chapter 7 of this standard references a test labeled Internal Fire Test. Section 7.1.1 references two installation conditions, Condition A and Condition B. Condition A represents all installation condition except for installation within non-ventilated combustible enclosures. Condition B represents installation within a non-ventilated combustible enclosure.
 - 2. Warranty
 - a. All units shall be provided with the following standard warranties:
 - 1) Grease duct systems are warranted to be free from defects in material and workmanship, under normal use and service, for a period of 20-years from the date of shipment.
 - b. This warranty shall not apply if:
 - 1) The equipment is not installed by a qualified installer per this installation guide; the operation manual should be kept with the equipment once installation is complete.
 - 2) The equipment is not installed in accordance with Federal, State, Local codes and regulations.
 - 3) The equipment design or sizing is not approved per MANUFACTURER'S specifications.

- 4) The equipment is misused, neglected, or not maintained per the MANUFACTURER'S maintenance instructions.
 - 5) The equipment is exposed to elevated temperatures due to a fire originating in the building, hood, fan, vent, or kitchen appliances.
 - 6) The equipment is not operated within its published capacity.
 - 7) The equipment is operated, tested, or stored in the presence of chlorines, solvents, refrigerant vapors, caustic substances, halogenated compounds, or other conditions that could cause condensation of corrosive materials within or on the system.
 - 8) The equipment is substituted or connected with parts not manufactured per Original Equipment Manufacturer.
 - 9) The invoice is not paid within the terms of the sales agreement.
 - 10) The manufacturer shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 20-year warranty period, upon examination by the manufacturer, such part will be repaired or replaced by manufacturer at no charge. The buyer shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without manufacturer's prior authorization, and all returned equipment shall be shipped by the buyer, freight prepaid to a destination determined by the manufacturer.
3. COMPLIANCE
- a. Intended for use with Type I kitchen hoods, which conform to the requirements of NFPA-96.
 - b. Kitchen exhaust ducted system shall be provided as a submittal package by the HVAC contractor for review and approval. Shop drawing shall include all products, sections of ducted system, accessories and be coordinated with the Kitchen Exhaust Hoods and the Kitchen exhaust fan showing connections to each. Include calculations of system performance in submittal.
4. CONSTRUCTION
- a. Inner duct section wall shall be constructed of .036" thick, 430 type stainless steel and be available in diameters 5" through 36".
 - b. Outer Duct section wall shall be constructed of 430 stainless steel at a minimum of .024" thickness.
 - c. Duct shall include 2 layers of Super Wool 607 Plus or Insulfrax Elite Blanket between the inner and outer wall insulation between the inner and outer wall.
 - d. Duct sections shall be held together by the means of a formed V clamp. V clamps shall be of the hex-head type with flanged stops and tapered "lead in" threads.
 - e. Duct joints shall be sealed with 3M Fire Barrier 2000+.
 - f. Duct wall assembly shall be tested and listed at 3/4" or zero inch clearance, according to classifications.
 - g. Manufacturers: Subject to compliance to the project specifications, manufactured kitchen exhaust duct system shall be manufactured by:
 - 1) Van Packard
 - 2) Captive Aire
 - 3) Metal-Fab
 - 4) Or Approved Equal

2.10 DUCTWORK ACCESSORIES

A. Dampers:

1. Low Pressure Manual Dampers: Provide dampers of single blade type or multi-blade type, constructed in accordance with SMACNA "HVAC Duct construction Standards".
2. Automatic Control Dampers: Refer to Division 23 section "Automatic Temperature Control" for control dampers; not work of this section.
3. Backdraft Relief Dampers: Provide dampers with parallel blades, counterbalanced and factory-set to relieve at .05 in. static pressure. Construct blades of 16-ga. aluminum; provide ½ in. diameter ball bearings, 1/2 in. diameter steel axles spaced on 9 in. centers. Construct from 2 in. x 1/2 in. x 1/8 in. steel channel for face areas 25 sq. ft. and under; 4 in. x 1-1/4 in. x 16 ga. channel for face areas over 25 sq. ft. Provide galvanized steel finish on frame with aluminum touch-up. Provide felted or rubber trim to assure tight, leak-proof seal when closed.
4. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
 - a. Air Balance, Inc.
 - b. Airguarde Corp.
 - c. American Warming & Ventilating, Inc.
 - d. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 - e. Louvers & Dampers, Inc.
 - f. Penn Ventilator Co.
 - g. Ruskin Mfg. Co.
 - h. Or Equal.

B. Fire Dampers:

1. Fire Dampers: Provide fire dampers, of types and sizes indicated. Construct casings of 11-ga. galvanized steel. Provide fusible link rated at 160 to 165 degrees F (71 to 74 degrees C) unless otherwise indicated. Provide out of air stream type damper in open position and with positive lock in closed position with stainless steel heat treated type 301 closure spring, and with the following additional features:
 - a. Damper Blade Assembly: Curtain type.
 - b. Blade Material: Steel, match casing.
 - c. Blade Material: Stainless steel.
2. Combination Fire/Smoke Dampers: Provide fire/smoke dampers, of types and sizes indicated. Construct casing of 11-ga. galvanized steel with bonded red acrylic enamel finish. Provide fusible link rated at 160 to 165 degrees F (71 to 74 degrees C) unless otherwise indicated. Provide additional frangible link containing explosive charge, connected in series with fusible link. Provide stainless steel spring loaded leakage seals in sides of casing, and 36 in. long wire leads for connecting smoke link to smoke detector, and the following additional features:
 - a. Damper Blade Assembly: Single-blade type.
 - b. Damper Blade Assembly: Multi-blade type.
 - c. Damper Blade Assembly: Curtain type.
 - d. Blade Material: Steel, matching casing.
 - e. Blade material: Stainless steel.

3. Motor-Driven Fire/Smoke Dampers: Provide motor-driven fire/smoke dampers in types and sizes indicated, with casing constructed of 11-ga. galvanized steel with bonded red acrylic enamel finish, fusible link 160 to 165 degrees F (71 to 74 degrees C), unless otherwise indicated, and curtain type stainless steel interlocking blades, with electric motor equipped with instant closure clutch, stainless steel cable damper blade linkage, motor mounting bracket, and 32 in. long wire leads for connecting to smoke detector, and with the following construction features:
 - a. Unit Assembly: Motor mounted outside air stream.
 4. Manufacturer: Subject to compliance with requirements, provide fire and smoke dampers of one of the following:
 - a. Air Balance, Inc.
 - b. American Warming & Ventilating, Inc.
 - c. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 - d. Louvers & Dampers, Inc.
 - e. Penn Ventilator Co.
 - f. Phillips-Aires
 - g. Ruskin Mfg. Co.
 - h. Or Equal.
- C. Combination fire smoke dampers.
1. Ratings:
 - a. HVAC Subcontractor shall verify wall ratings utilizing the architectural code plan.
 - b. Fire Closure Temperature: Each combination fire smoke damper shall be equipped with a factory installed heat responsive device rated to close the damper when the temperature at the damper reaches 165°F
 - c. Leakage: Dampers shall have a UL555S leakage rating of Leakage Class I or II.
 - d. Differential Pressure: Dampers shall have a minimum UL 555S differential pressure rating of 4 in. wg.
 - e. Velocity: Dampers shall have a minimum UL 555S velocity rating of 2000 fpm.
 2. Construction:
 - a. Frame: Damper frame shall be 16 ga. galvanized steel formed into a 5" x 1" structural hat channel. Top and bottom frame members on dampers less than 17" high shall be low profile design to maximize the free area of these smaller dampers. Frame shall be 4-piece construction with 1-½" (minimum) integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.
 - b. Blades: Damper blades shall be 16 ga. galvanized steel strengthened by three longitudinal 1" deep Vee grooves running the entire length of each blade. Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening.
 - c. Blade Stops: Each blade stop (at top and bottom of damper frame) shall occupy no more than ½" of the damper opening area to allow for maximum free area and to minimize pressure loss across the damper.
 - d. Seals:
 - 1) Blade Edge: Blade seals shall be extruded silicone rubber permanently bonded to the appropriate blade edges.
 - 2) Jamb: Flexible stainless steel compression type.

3. Linkage: Concealed in jamb.
 - a. Axles: Minimum $\frac{1}{2}$ inch dia. plated steel. Frame: Galvanized steel (in gauges required by manufacturer's UL listing).
 - b. Sleeves: Damper shall be supplied as a single assembly with an integral factory sleeve.
 - c. Retaining Angles: Damper shall be supplied with factory retaining angles sized to provide installation overlap in accordance with the manufacturer's UL listing.
 - d. Bearings: Axle bearings shall be sintered bronze sleeve type rotating in polished extruded holes in the damper frame.
 4. Actuators:
 - a. Type: Electric, 120V AC, 2-position
 - b. Mounting: External
 5. Source quality control
 - a. Factory Tests: Factory cycle damper and actuator assemblies to assure proper operation.
 6. Manufacturer: Subject to compliance with requirements, provide fire and smoke dampers of one of the following:
 - a. Air Balance, Inc.
 - b. American Warming & Ventilating, Inc.
 - c. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 - d. Louvers & Dampers, Inc.
 - e. Penn Ventilator Co.
 - f. Phillips-Aires
 - g. Greenheck
 - h. Or Equal.
- D. Turning Vanes:
1. Manufactured Turning Vanes: Provide double thickness airfoil turning vanes constructed of 1-1/2 in. wide curved blades set at $\frac{3}{4}$ in. o.c., supported with bars perpendicular to blades set at 2 in. o.c, and set into side strips suitable for mounting in ductwork.
 2. Manufacturer: Subject to compliance with requirements, provide turning banes of one of the following:
 - a. Aero Dyne Co.
 - b. Airsan Corp.
 - c. Anemostat Products Div.; Dynamics Corp. of America.
 - d. Barber-Colman Co.
 - e. Duro Dyne Corp.
 - f. Environmental Elements Corp.; Subs, Koppers Co., Inc.
 - g. Hart & Cooley Mfg. Co.
 - h. Register & Grille Mfg. Co., Inc.
 - i. Southern, Inc.
 - j. Or Equal.
- E. Duct Hardware:
1. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
 - a. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.

- b. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12 in.. Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.
 - 2. Manufacturer: Subject to compliance with requirements. Provide duct hardware of one of the following:
 - a. Ventfabrics, Inc.
 - b. Young Regulator Co.
 - c. Or Equal.
- F. Duct Access Doors:
 - 1. General: Provide duct access doors of a size as required to service and maintain device in duct. All access doors to be a minimum of 12 in.x12 in. and to be gasketed and installed air tight. Provide one access door at each control damper, humidifier, coil, fire damper, and any device that requires attention.
 - 2. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12 in. high and smaller, 2 handle-type latches for larger doors.
 - 3. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:
 - a. Air Balance, Inc.
 - b. Duro Dyne Corp.
 - c. Register & Grille Mfg. Co., Inc.
 - d. Ruskin Mfg. Co.
 - e. Ventfabrics, Inc.
 - f. Zurn Industries, Inc.; Air Systems Div.
 - g. Or Equal.
- G. Flexible Connectors:
 - 1. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibration of connected equipment. Exception shall be on Kitchen exhaust ductwork.
 - 2. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:
 - a. American/Elgen Co.; Energy Div.
 - b. Duro Dyne Corp.
 - c. Flexaust (The) Co.
 - d. Ventfabrics, Inc.
 - e. Or Equal.

2.11 ACOUSTIC DUCT LINING

- A. Lining for Rectangular Metal Ducts: All ducts, where shown or noted on the drawings, shall be lined with 1-1/2 in. (R-8) thick hospital grade liner similar to "Permacote Linacoustic HP" fiberglass duct liner with factory-applied surface and edge coating. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the airstream surface coating should contain an immobilized, EPA-registered, anti-microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G22. The duct liner shall conform to the requirements of ASTM C 1071 and C1104, with an NRC not less than .75 as tested per ASTM C 423 using a Type "A" mounting, and a thermal conductivity no higher than .24 at 75EF mean temperature.
- B. Material Handling and Storage: Liner shall be kept clean and dry during transportation, storage and installation. Care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.
- C. Manufacturer: Subject to compliance with the above provide duct sound lining in accordance with the above performance criteria description.

2.12 AIR OUTLETS AND INLETS

- A. Ceiling Air Diffusers:
 - 1. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Stamped face diffusers will not be acceptable.
 - 2. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw, drop and noise criteria ratings for each size device as listed in manufacturer's current data.
 - 3. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
 - 4. Types: Provide ceiling diffusers of type, capacity, throw, blow and with accessories as listed on diffuser schedule.
 - a. Ceiling Diffusers shall be of the restricted multi-orificed jet induction and air mixing type consisting of louver sections with built-in diffusing vanes. The vanes shall be arranged to discharge air from adjacent louvers at an angle of 45 degrees in opposite directions to insure rapid mixing of primary and room air. Diffusing vanes shall be welded and mechanically fastened to the adjacent louver sections to make a rigid unit. The vanes shall extend to the discharge edges of the louvers. Where louver sections join the core frame, the louver ends shall be welded to the core frame. The leaving edge of each louver shall be hemmed and the louver ends shall be rounded and hemmed before welding to the core frames.
 - b. Diffusers shall be fabricated of aluminum or steel-welded construction, and shall be provided with a removable core permitting easy access to the neck connection. The diffuser neck shall extend no less than 1 in. above the core to accommodate an internal duct connection to prevent leakage into the ceiling space.

- c. Finish shall be baked enamel. Color as selected by A/E.
 - d. Plaque diffuser shall be one piece seamless back cone with round inlet color and inner removable plaque assembly.
- 5. Diffuser Dampers:
 - a. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of diffuser. Provide in each ceiling diffuser.
- 6. Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following:
 - a. Tuttle & Bailey Agitair Series
 - b. Metalaire – “5000 IV”
 - c. Price
 - d. Krueger
 - e. Or Equal
- B. Wall Registers and Grilles:
 - 1. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
 - 2. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
 - 3. Compatibility: Provide registers and grilles with border styles that are compatible with adjacent systems, and that are specifically manufactured to fit into wall and ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of register and grille.
 - 4. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule:
 - 5. Pattern: Register and grille patterns shall have style as identified on Drawings:
 - 6. Dampers: Opposed Blade adjustable assembly, key operated from face of register.
 - 7. Accessories:
 - a. Plaster Frame: Perimeter frame designed to act as plaster stop and register or grille anchor. Provide where required.
 - b. Operating Keys: Tools designed to fit through register or grille face and operate volume control device and/or pattern adjustment.
 - 8. Finish: Register and Grille Finishes shall be baked enamel color as selected by the Architect.
 - 9. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one the following:
 - a. Agitair (Air Devices)
 - b. Metalaire
 - c. Price
 - d. Krueger
 - e. Or Equal.

C. Ceiling Registers and Grilles:

1. General: Except as otherwise indicated, provide manufacturer's standard "Egg-Crate" type registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
2. Compatibility: Provide registers and ceiling grilles with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling construction.
3. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.
4. Register and Grille Materials:
 - a. Aluminum Construction: Manufacturer's standard extruded aluminum frame and core.
5. Register and Grille Faces:
 - a. 1/2 in. x 1/2 in. "Egg-Crate" with one in. border frame.
6. Register and Grille Dampers:
 - a. Opposed Blade: Adjustable opposed blade damper assembly, key operated from face of register (provide for registers only).
7. Register and Grille Finishes shall be baked enamel color as selected by the Architect.
8. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one of the following:
 - a. Agitair (Air Devices)
 - b. Metalaire
 - c. Price
 - d. Krueger
 - e. Or Equal.

D. Linear Diffusers

1. Linear slot diffusers shall be furnished and installed as indicated on the drawings.
2. Provide shop drawings accompanied by itemized list indicating units' location and appropriate product submittal drawings provided by the manufacturer.
3. Exact dimensions of walls and ceiling are as per the architectural drawings. Install diffusers so they fit properly in the ceiling system with suspension wire (48 in. o/c MAX.) and/or attachment plates — as required.
4. Coordinate installation with General Contractor and other sub-contractors.
5. The linear slot diffuser shall utilize heavy wall extruded aluminum air deflector frames. These frames shall be designed to accommodate notched compressible space bars, complete with integral hanger, spaced approximately 24 in. on center. The steel air pattern controllers are fully adjustable and can be moved from side to side to create various air pattern configurations. These dual pattern controllers shall be fully adjustable to allow shut-off without adding any blank-off devices. The spacer bars and pattern controllers shall be removable for on-site modification and trimming.
6. The Linear slot diffuser shall be complete with factory end conditions as shown or indicated.
7. Supply air engineered plenums shall be provided and manufactured of heavy gauge wipe coat steel. These units shall be insulated with a side inlet collar.

8. When engineered plenum end caps cannot be positioned directly over the linear spacer bar due to field conditions, install MB or equal Blank-Off from plenum end cap to next spacer bar.
9. MB or equal Blank-Off shall be manufactured of heavy gauge steel painted black.
10. Linear Bar Grilles: Furnish and install extruded bar supply/return grilles of the sizes and mounting types indicated on the plans and outlet schedule.
 - a. Construction: Grilles shall have fixed degree blades, spaced 7/16 in. on center. The outlet core shall have extruded aluminum receiving bar. Blades shall run parallel to the long dimension of the grille. The grille border shall be heavy duty extruded aluminum construction with factory mitered corners and reinforcing support bars for extra support for the core receiving bar. The support and receiving bars shall not exceed 8 in. on center. The core shall be held into the border with removable core clips allowing the removal of the core without special tools.
 - b. Finish: The grille shall be finished in B12 White Powder Coat. Paint finish shall pass 500 hours of salt spray exposure with no measurable creep in accordance with ASTM D1654 and 1000 hours with no rusting or blistering as per ASTM D610 and ASTM D714.
 - c. Manufacturer: Subject to compliance with requirements, provide linear bar grilles of one of the following:
 - 1) Agitair
 - 2) Metalaire
 - 3) Price
 - 4) Krueger
 - 5) Or equal

2.13 FIRESTOP SYSTEMS

- A. General: Provide firestopping at all new and existing fire-rated construction where penetrated by the Work of this Section. Also provide smoke sealing at all smoke barrier and smoke partition construction where penetrated by the work of this section.
- B. Refer to Section 078413 - Penetration Firestopping, for all product requirements for maintaining integrity of fire-rated and smoke-rated construction at penetrations.

2.14 WALL AND CEILING ACCESS DOORS

- A. General: Furnish and install access panels, at all new construction where required for access to the Work of this Section. Furnish access doors for access to all concealed control valves, motor operated dampers, fire doors, and all other concealed parts of the HVAC system that require accessibility for the proper operation and maintenance of the system.
- B. Coordinate locations and schedule with the work of trades involved with construction in which access panels will be installed.
- C. Access doors shall be heavy gage steel with 1 in. frame. Door shall be fastened to frame with continuous piano hinge. Entire door and frame assembly shall be prime painted and be completed with cylinder lock and two keys. Door and frame shall match fire rating of wall or ceiling installed into.

- D. Manufacturer: Subject to compliance with requirements, provide access doors of one of the following:
1. Inland Steel Products Company, "Milcor"
 2. Walsh-Hannon-Gladwin Inc., "Way Lector"
 3. Or Equal.
- 2.15 AUTOMATIC TEMPERATURE CONTROLS (DDC) ENERGY MANAGEMENT SYSTEM (EMS/ATC)
- A. BASIC COMPONENTS AND SYSTEMS:
1. General: Provide control products in sizes and capacities indicated, consisting of valves, thermostats, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard materials and components as published in their product information; designed and constructed as recommended by manufacturer, and as required for application indicated. All equipment and systems shall integrate to the existing Honeywell Niagara Building Management System. Trained, certified and authorized technicians shall have a minimum of 5 years experience with the existing EMS/ATC System installed at the high school and must have a proven track record of successful projects.
 2. Electric Wiring:
 - a. All electric wiring and wiring connections, either line voltage or low voltage, from the main electric panels to the ATC panels, and from the ATC related panels to the individual control devices i.e. valves, sensors, etc. required for the installation of the control system, as herein specified shall be provided by the control contractor unless specifically shown on the electrical drawings or called for in the electrical specifications. The wiring installation shall be in accordance with National and Local Codes and with the Electrical portion of these specifications. All wiring shall be run concealed wherever possible. Exposed wiring in occupied areas shall be run in raceways. Raceways shall be Wiremold 200 series with all elbows, raceways, covers, mounting stops, box extensions and wiring for a complete and neat installation. All wiring located in mechanical spaces, boiler rooms, fan rooms, etc. shall be installed in metal conduit.
 - b. All wiring above ceilings and all mechanical spaces shall follow routing of piping and where not possible shall be in conduit. All exposed wire shall be bundled and wire tied and shall be supported to adjacent piping. Draped and free floating wire will not be allowed.
 - c. All terminations of wire at control devices shall be looped and supported adequately.
 - d. All wiring shall comply with the requirements of the electrical section of the specification.
 3. Operators: Size electronic actuators to operate their appropriate valves with sufficient reserve power to provide smooth modulating action or 2-position action as specified.
 4. Water Pipe Sensors: Provide sensing elements of rod-and-tube type for linear output, furnished complete with separable protecting wells filled with heat conductive compound, factory calibrated and tamper-proof. Locate adjustable controllers inside metal enclosures with cylinder lock and key to prevent unauthorized setting.
 5. Electrical Requirements: Provide switches, electrical devices and relays that are required for a complete and operating system and are characteristic for this project.

B. DDC CONTROLLER

1. DDC Controllers shall be a 16-bit stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point I/O schedule. Each controller shall support a minimum of three (3) Floor Level Application Specific Controller Device Networks.
2. Each DDC Controller shall have a minimum of 72 Megabytes of memory to support its own operating system and databases, including:
 - a. Control processes
 - b. Energy management applications
 - c. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
 - d. Historical/trend data for points specified
 - e. Maintenance support applications
 - f. Custom processes
 - g. Operator I/O
 - h. Dial-up communications
 - i. Manual override monitoring
3. Each DDC Controller shall support firmware upgrades without the need to replace hardware.
4. Provide all processors, power supplies and communication controllers so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.
5. DDC Controllers shall provide communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers or terminals.
6. As indicated in the point I/O schedule, the operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points.
7. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.
8. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.
9. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.

10. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 60 days. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention. Should DDC Controller memory be lost for any reason, the user shall have the capability of reloading the DDC Controller via the local RS-232C port, via telephone line dial-in or from a network workstation PC.
11. Provide a separate DDC Controller for each piece of equipment being added under this contractor. It is intended that each unique system be provided with its own point resident DDC Controller.

C. HVAC MECHANICAL EQUIPMENT CONTROLLERS

1. HVAC Mechanical Equipment Controllers shall be a 12-bit stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors.
2. Each HVAC Mechanical Controller shall have 72 Megabytes of memory to support its own operating system and databases, including:
 - a. Control processes
 - b. Energy management applications
 - c. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
 - d. Historical/trend data for points specified
 - e. Maintenance support applications
 - f. Custom processes
 - g. Operator I/O
 - h. Remote communications
3. HVAC Mechanical Equipment Controllers shall provide a RS-232C serial data communication port for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals.
4. HVAC Mechanical Equipment Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device.
5. Each HVAC Mechanical Equipment Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all components. The HVAC Mechanical Equipment Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.
6. Kitchen exhaust fans and respective MAU units shall be controlled through kitchen equipment control panel modulating exhaust and makeup air rates as commanded.

7. All HVAC Mechanical equipment controllers shall be powered on emergency power circuits in the event of the loss of normal and emergency power, there shall be an orderly shutdown of all HVAC Mechanical Equipment Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours. Upon restoration of normal or emergency power, the HVAC Mechanical Equipment Controller shall automatically resume full operation without manual intervention. Should HVAC Mechanical Equipment Controller memory be lost for any reason, the user shall have the capability of reloading the HVAC Mechanical Equipment Controller via the local RS-232C port, via telephone line dial-in or from a network workstation PC.

D. DDC & HVAC MECHANICAL EQUIPMENT CONTROLLER RESIDENT SOFTWARE FEATURES

1. General: The software programs specified in this Section shall be provided as an integral part of DDC and HVAC Mechanical Equipment Controllers and shall not be dependent upon any higher level computer for execution. All points shall be identified by up to 30 character point name and 16 character point descriptor. The same names shall be used at the PC workstation. All digital points shall have user defined two-state status indication (descriptors with minimum of 8 characters allowed per state (i.e. summer/winter)).
2. Control Software Description: The DDC and HVAC Mechanical Equipment Controllers shall have the ability to perform the following pre-tested control algorithms:
 - a. Two-position control
 - b. Proportional control
 - c. Proportional plus integral control
 - d. Proportional, integral, plus derivative control
 - e. Automatic tuning of control loops
3. DDC and HVAC Mechanical Equipment Controllers shall provide the following energy management routines for the purpose of optimizing energy consumption while maintaining occupant comfort.
 - a. Start-Stop Time Optimization (SSTO) shall automatically be coordinated with event scheduling. The SSTO program shall start HVAC equipment at the latest possible time that will allow the equipment to achieve the desired zone condition by time of occupancy. The SSTO program shall also shut down HVAC equipment at the earliest possible time before the end of the occupancy period, and still maintain desired comfort conditions. The SSTO program shall operate in both the heating and cooling seasons.
 - b. Event Scheduling: Provide a comprehensive menu driven program to automatically start and stop designated points or groups of points according to a stored time.
 - c. It shall be possible to individually command a point or group of points.
 - d. For points assigned to one common load group, it shall be possible to assign variable time delays between each successive start or stop within that group.
 - e. The operator shall be able to define the following information:
 - 1) Time, day
 - 2) Commands such as on, off, auto, and so forth.
 - 3) Time delays between successive commands.
 - 4) There shall be provisions for manual overriding of each schedule by an appropriate operator.

- f. It shall be possible to schedule events up to one year in advance.
 - 1) Scheduling shall be calendar based.
 - 2) Holidays shall allow for different schedules.
 - 3) Enthalpy switchover (economizer) .The Energy Management Control Software (EMCS) will control the position of the air handler relief, return, and outside air dampers. If the outside air dry bulb temperature falls below changeover set point the EMCS will modulate the dampers to provide 100 percent outside air. The user will be able to quickly changeover to an economizer system based on dry bulb temperature and will be able to override the economizer cycle and return to minimum outside air operation at any time.
- g. Temperature-compensated duty cycling.
 - 1) The DCCP (Duty Cycle Control Program) shall periodically stop and start loads according to various patterns.
 - 2) The loads shall be cycled such that there is a net reduction in both the electrical demands and the energy consumed.
- h. Automatic Daylight Savings Time Switchover: The system shall provide automatic time adjustment for switching to/from Daylight Savings Time.
- i. Night setback control: The system shall provide the ability to automatically adjust setpoints for night control.
- j. The Peak Demand Limiting (PDL) program shall limit the consumption of electricity to prevent electrical peak demand charges.
 - 1) PDL shall continuously track the amount of electricity being consumed, by monitoring one or more electrical kilowatt-hour/demand meters. These meters may measure the electrical consumption (kWh), electrical demand (kW), or both.
 - 2) PDL shall sample the meter data to continuously forecast the demand likely to be used during successive time intervals.
 - 3) If the PDL forecasted demand indicates that electricity usage is likely to exceed a user preset maximum allowable level, then PDL shall automatically shed electrical loads.
 - 4) Once the demand peak has passed, loads that have been shed shall be restored and returned to normal control.
- k. DDC and HVAC Mechanical Equipment Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
 - 1) A single process shall be able to incorporate measured or calculated data from any and all other DDC and HVAC Mechanical Equipment Controllers on the network. In addition, a single process shall be able to issue commands to points in any and all other DDC and HVAC Mechanical Equipment Controllers on the network. Database shall support 30 character, English language point names, structured for searching and logs.
 - 2) Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of a dial-up connection to a remote device such as a printer or pager.
- l. DDC and HVAC Mechanical Equipment Controller shall provide a HELP function key, providing enhanced context sensitive on-line help with task orientated information from the user manual.

- m. DDC and HVAC Mechanical Equipment Controller shall be capable of comment lines for sequence of operation explanation.
- n. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC and HVAC Mechanical Equipment Controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the DDC and HVAC Mechanical Equipment Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.
 - 1) All alarm or point change reports shall include the point's English language description and the time and date of occurrence.
 - 2) The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of six priority levels shall be provided for each point. Point priority levels shall be combined with user definable destination categories (PC, printer, DDC Controller, etc.) to provide full flexibility in defining the handling of system alarms. Each DDC and HVAC Mechanical Equipment Controller shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.
 - 3) Alarm reports and messages will be directed to a user-defined list of operator devices or PCs based on time (after hours destinations) or based on priority.
 - 4) In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 200 character alarm message to more fully describe the alarm condition or direct operator response.
 - 5) In dial-up applications, operator-selected alarms shall initiate a call to a remote operator device.
- o. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for points as specified in the I/O summary.
 - 1) Any point, physical or calculated may be designated for trending. Any point, regardless of physical location in the network, may be collected and stored in each DDC and HVAC Mechanical Equipment Controllers point group. Two methods of collection shall be allowed: either by a pre-defined time interval or upon a pre-defined change of value. Sample intervals of 1 minute to 7 days shall be provided. Each DDC and HVAC Mechanical Equipment Controller shall have a dedicated RAM-based buffer for trend data and shall be capable of storing a sufficient number of data samples. All trend data shall be available for transfer to a Workstation without manual intervention.
 - 2) DDC and HVAC Mechanical Equipment Controllers shall also provide high resolution sampling capability for verification of control loop performance. Operator-initiated automatic and manual loop tuning algorithms shall be provided for operator-selected PID control loops as identified in the point I/O summary.
- p. Loop tuning shall be capable of being initiated either locally at the DDC and HVAC Mechanical Equipment Controller, from a network workstation or remotely using dial-in modems. For all loop tuning functions, access shall be limited to authorized personnel through password protection.

- q. DDC and HVAC Mechanical Equipment Controllers shall be capable of automatically accumulating and storing run-time hours for digital input and output points and automatically sample, calculate and store consumption totals for analog and digital pulse input type points, as specified in the point I/O schedule.
- r. Include (12) hours total of Owner training associated with new EMS graphics, alarm points and equipment sequence of operations.
- 4. Sequence of operation and control points list: Refer to control drawings.
- 5. Building ATC/EMS System components shall be as manufactured on Johnson Controls and EMS control integration shall be performed by Johnson Controls Authorized System Installer as specified in this section.
- 6. DDC System Software - Update the existing DDC building ATC control and energy management system front-end software graphics and programming, including but not limited to the following scope of work:
 - a. Interface/update new equipment graphics onto existing EMS system including all relevant building floor plan graphics (i.e. mechanical rooms, floor plans, rooftop, outdoor locations of equipment).
 - b. Include all necessary EMS shop drawings and submittals for review and approval.

E. KITCHEN VENTILATION CONTROL SYSTEM

1. SYSTEM DESCRIPTION

- a. Kitchen Demand Control Ventilation (DCV) control system will monitor cooking activity under the kitchen hood via auto-calibrated infrared Optic Sensors consisting of an Emitter and Receiver mounted on either side of the hood canopy as well as duct mounted three-wire Temperature Sensor. System shall be capable of operating exhaust fan motors at minimum speeds of 30%-50%. Optic Sensors, with dedicated Air Purge Units, shall immediately increase fan speeds to 100% upon detection of smoke or effluent in the hood canopy with a response time of 0.2 seconds. Upon evacuation of smoke or effluent the fans will modulate according to exhaust temperature for optimal energy savings. System will actively modulate makeup airflow according to exhaust load to maintain correct space airflow balance.
- b. Demand Control Ventilation (DCV) system that only includes a temperature sensor to detecting cooking activity shall not be permitted. Additionally, a DCV system that includes infrared sensors without a dedicated air purge unit and auto-recalibration of sensors shall not be permitted. Modulating dampers or other devices that may impede exhaust airflow and grease extraction may not be permitted.
- c. Factory assembled, modular, control system, consisting of the following components:
 - 1) System Controller
 - a) Communicates to Hood Controller, Touchpad(s), Temperature and Optic Sensors via proprietary RS-485 Protocol.
 - b) Controller capable of communicating with Hood Controllers, Touchpads, Auxiliary Touchpads, Auxiliary Power Supplies, and Auxiliary Light Controllers.
 - c) Communicates with Variable Frequency Drives via Modbus Protocol.
 - d) Programmable I/O containing Digital Inputs, Digital Outputs, Analog Input and Analog Output.
 - e) Adjustable Temperature range vs. Fan Speed Curve.
 - f) Automatic On/Off based on hood temperature or programmable clock for individual fan schedules.

- g) Removable USB memory storage for setup files and operational performance history data.
 - h) Calculates appropriate speeds for exhaust and supply fans based on cooking temperature demand and optical infrared monitoring.
 - i) Internet-based Service Application for monitoring, programming and troubleshooting.
 - j) BACnet over TCP/IP Interface for communication to Building Automation System.
- 2) Hood Controller
 - a) Monitors Temperature and Optic Sensors on each kitchen hood and sends the sensor data to the System Controller via RS-485 Protocol communications.
 - b) Steel beam clamps for installation on hoods or other mechanical structures above kitchen hood.
 - c) Hood Controller Temperature Rating: 0° to 50°C, 32° to 120°F
- 3) Temperature Sensor
 - a) Platinum three-wire resistive temperature device (RTD) encased in stainless steel tube.
 - b) Threaded housing shall be assembled in UL-Listed grease-tight fittings for installation in exhaust duct or kitchen hood canopy.
 - c) Temperature sensors shall be wired to Hood Controller via 8-pin, RJ-45 connectors to the RS-485 Protocol Hood Network Cables.
 - d) Temperature Rating: 0° to 535°C, 32° to 1000°F
- 4) Optic Sensors
 - a) Optic Sensors shall consist of conformal coated Emitter and Receiver boards housed in stainless steel enclosures on opposite ends of the kitchen hood interior.
 - b) Infrared sensors capable of detecting effluent in the air at any point along the length of the beam with a response time of 0.2 seconds.
 - c) Sensors shall be capable of spanning 3 to 40 feet of kitchen hood interior with automatic gain adjustment.
 - d) Optic sensors shall auto-calibrate every day at start up and/or every 24 hours.
 - e) Sensors shall be wired to Hood Controller with liquid-tight connectors at sensor board via the Air Purge Unit.
 - f) Optic Sensor Temperature Rating: 0° to 85°C, 32° to 185°F
- 5) Air Purge Unit (APU)
 - a) Air Purge Unit (APU) consisting of a 12VDC blower and interface PCB inside an 18 gauge galvanized steel enclosure shall be installed to reduce the accumulation of contamination on the Optic Sensor lenses and reduces heat buildup inside the Optic Sensor enclosure.
 - b) APU shall physically connect to the Optic Sensor enclosure via stainless steel conduit pipe.
 - c) Blower fan bearings shall be permanently lubricated.
 - d) APU Temperature Rating: 0° to 50°C, 0° to 125°F
- 6) Touchpad
 - a) Full color screen, 2.8" diagonal, QVGA resolution screen to display operating status and programmable menus.

- b) Integrated membrane FANS switch for turning fans from Active Mode (On) and Standby Mode (off).
- c) Integrated membrane LIGHTS switch for turning hood lights On / Off via line voltage relays to change state of line voltage.
- d) Soft keys and Directional integrated membrane switches for user to boost fans to full speed, access programming menus, access diagnostic and help screens.
- e) Fully programmable graphical interface to conform to operators' hood and fan nomenclature.
- 7) Aux Touchpad
 - a) Aux Touchpad shall be used as an additional user interface, if applicable, for the control of the FANS, LIGHTS and 100% switches.
 - b) Integrated membrane FANS switch shall change associated hoods between Active Mode (fans running) to Standby Mode (fans off).
 - c) Integrated membrane LIGHTS switch shall change the state of associated line voltage relays which may be used to control Hood Lights circuits.
 - d) Integrated membrane 100% Switch shall allow users to temporarily boost fan speeds to full speed on associated hoods.
 - e) Stainless steel cover plate (304L) for durable construction and smooth finish.
 - f) Synthetic overlay for water protection.
- 8) Aux Power Supply
 - a) Aux Power Supply shall be used for large installations when additional power is needed to power Hood Controllers, Optic Sensors and Touchpads.
 - b) Aux Power Supply Temperature Rating: 5° to 40°C, 41° to 104°F
- 9) Aux Lighting Controller
 - a) Aux Lighting Controller shall be used for large installations where there is a need to control multiple hood light circuits.
 - b) Aux Lighting Controller Temperature Rating: 5° to 40°C, 41° to 104°F

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

A. Penetrations through new and existing construction as required for the Work of this Section:

- 1. Coring: Perform all coring for required work.
- 2. Cut openings in new and existing non-masonry construction where required for penetrations. All cutting shall conform to the requirements of Section 017329 – Cutting and Patching.

3.2 INSTALLATION OF HANGERS & ATTACHMENTS

A. Vibration Control: Refer to Section 230548 and drawing VC-1, VC-2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic

restraint manufacturer shall recommend the correct connection and device as outlined in Section 230548 and drawing VC-1, VC-2.

- B. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- C. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors, and other building structural attachments.
- D. Prior to installation of hangers, supports, anchors, and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purposes of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.
- E. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through the openings at the tops of inserts.
- F. Install hangers, supports, clamps, and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacing complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
 - 1. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
 - 2. Prevent electrolysis in support of copper tubing by the use of hangers and supports which are copper plated, or by other recognized industry methods.
 - 3. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
 - 4. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
 - 5. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.
 - 6. Insulated Piping: Comply with the following installation requirements:
 - a. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
 - b. Shields: For pipe sizes up to and including 4 in. provide heavy gage shield at each hanger point.

- c. Saddles: For all pipe sizes over 4 in. provide saddle at each hanger point. Completely fill void in saddle with loose insulation.
- G. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer for loading and stresses to connected equipment.
- H. Fabricate and install anchor by welding steel shapes, plates, and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.
- I. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.
- J. Anchor Spacing: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.
- K. Concrete housekeeping bases shall be provided by the General Contractor for all floor-mounted equipment. Size bases to extend minimum of 4 in. beyond equipment base in any direction; and 4 in. above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.
- L. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands.
- M. Adjusting and Cleaning:
 - 1. Hanger Adjustment: Adjust hangers so as to distribute loads equally on attachments.
 - 2. Support Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
 - 3. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.3 INSTALLATION OF MECHANICAL IDENTIFICATION

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces; install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- B. General: Install pipe markers of the following type on each system indicated to receive identification, and include arrows to show normal direction of flow:
 - 1. Plastic pipe markers, with application system as indicated. Install on pipe insulation segment where required for hot non-insulated pipes.
- C. Locate pipe markers and color bands as follows wherever piping is in or above occupied spaces or corridors, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
3. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing of 50 ft. along each piping run, except reduce spacing to 25 ft. in congested areas of piping and equipment.
7. On piping above removable acoustical ceilings.

D. Valve Identification:

1. General: Provide valve tag on every valve, cock, and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.
2. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by Architect/Engineer.

E. Mechanical Equipment Identification:

1. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device.
2. Lettering Size: Minimum 1/4 in. high lettering for name of unit where viewing distance is less than 2 ft. – 0 in., 1/2 in. high for distances up to 6 ft. – 0 in. and proportionately larger lettering for greater distances. Provide secondary lettering of 2/3 to 3/4 of size of the principal lettering.

F. Ductwork Identification:

1. Install or apply labels per manufacturer's recommendations.
2. Install in locations where it can be viewable by personnel.

G. Adjusting and Cleaning:

1. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
2. Cleaning: Clean face of identification devices, and glass frames of valve charts.

3.4 INSTALLATION OF MECHANICAL INSULATION

A. Installation of Piping Insulation:

1. Insulation
2. Composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated. Do not cover calibrated balance valves until testing adjusting and balancing has been completed. Omit insulation on hot piping within radiation enclosures which serve the zone: hot water passing through the zone must be insulated or unit cabinets; on cold piping within unit cabinets provided piping is located over drain pan. (Couplings in mechanical grooved systems will be insulated.)

3. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
4. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance tests.
5. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
6. Clean and dry pipe surfaces prior to insulating. Butt installation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
7. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
8. Cover valves, fittings and similar items in each piping system with equivalent thickness.
9. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
10. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3 in. wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 in. wide vapor barrier tape or band.

B. Installation of Ductwork Insulation:

1. General: Do not insulate ductwork until ductwork has been sealed successfully, pressure tested, and approved for application of insulation by engineer or commissioning agent. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
2. Install insulation materials with smooth and even surfaces.
3. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
4. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.
5. Extend ductwork insulation without interruption through walls, floors and similar ductwork penetrations, except where otherwise indicated.
6. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internal insulation or sound absorbing linings have been installed.

C. Installation of Equipment Insulation:

1. General: Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
2. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gaping joints and excessive voids resulting from poor workmanship.
3. Maintain integrity of vapor-barrier on equipment insulation and protect it to prevent puncture and other damage.
4. Do not apply insulation to equipment, breechings, or stacks while hot.
5. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.
6. Coat insulated surfaces with layers of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and

depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.

7. Cover insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2 in. Apply over vapor barrier where applicable.
8. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruption of insulation.
9. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

D. Protection and Replacement:

1. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
2. Protection; Insulation Sub-subcontractor shall advise HVAC Subcontractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

3.5 INSTALLATION OF GREASE DUCT INSULATION

A. EXAMINATION

1. Do not begin installation until substrates have been properly prepared.
2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3. Coordinate installation of the Thermal Ceramics FastDoor XL, Ductmate, 3M and or equal access door between sheet metal and insulation trades.

B. PREPARATION

1. Remove dirt and dust from surfaces of openings and items penetrating rated floors and rated walls.

C. INSTALLATION

1. Install 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal in direct contact with the ductwork in accordance with manufacturer's instructions, applicable laboratory listings and building code reports, and referenced standards. For additional complex duct design installation recommendations, see the Thermal Ceramics' complete installation guide.
2. Install two layers of 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal for zero clearance and a 1 and 2 hour commercial kitchen grease duct applications per ASTM E 2336.
 - a. General Installation Instructions for Double Layer Installations: The inside and outside layers of 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal blankets are cut to a length that will fit around the duct and meet with a tight butt joint. Adjacent blankets on the inside and outside layers are tightly butted against each other. Joints between blankets on the outside layer shall be offset from joints on the inside layer by a minimum 6 in. (152 mm). Cut edges of the blanket shall be taped with aluminum foil tape. During installation the blankets are temporarily held in place with filament tape until the wrap is mechanically attached with steel bands or steel insulation pins.

3. Install 1 layer of 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal for 1 and 2 hour air ventilation duct enclosures per ISO 6944-1985.
 - a. General Installation Instructions for Single Layer Installations: 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal blankets are cut to a length that will fit around the duct and overlap itself no less than 3 in. (152 mm). Adjacent blankets overlap each other a minimum of 3 in. (152 mm), or they can be fitted together with a tight butt joint and covered with a 6 in. (305 mm) wide collar centered over the butt joint. Cut edges of the blanket are taped with aluminum foil tape. During installation the blankets are temporarily held in place with filament tape until the wrap is mechanically attached with steel bands or steel insulation pins.
4. Install one layer of Thermal Ceramics PlenumWrap+ on plastic pipe or plastic jacketed electrical cables per Intertek listing reports and testing to NFPA 262 and UL1887.
 - a. Cut plenum blanket to a length that will fit around the pipe or cable and overlap itself no less than 1 in. (25 mm). Adjacent blankets overlap each other a minimum of 1 in. (25 mm). Plenum blanket is secured using either 1/2 in. (12 mm) steel banding or 16 gauge carbon or stainless steel tie wire on maximum 11-1/2 in. (292 mm) spacing.
5. Mechanical Fastening of Enclosure Material to Ductwork:
 - a. Banding - Carbon steel or stainless steel banding is used to hold the outer layer of the blanket enclosure in place. Banding is minimum 1/2 in. (12.7 mm) wide, and is placed around the entire perimeter of the duct on maximum 10-1/2 in. (267 mm) centers and 1-1/2 in. (38 mm) from each blanket or collar edge.
 - b. Pinning - To prevent blanket sag on duct spans wider than 24 in. (610 mm), minimum 12-gauge steel insulation pins are welded to the duct along bottom horizontal and outside vertical runs in columns spaced 12 in. (305 mm) apart, 6 to 12 in. (152 to 305 mm) from each edge, and on 10-1/2 in. (267 mm) centers. Pins are locked in place with 1-1/2 in. (38 mm) diameter or 1-1/2 in. (38 mm) square galvanized steel speed clips or cup head pins. Pins are turned down or the excess cut off to eliminate sharp edges.
6. Grease Duct Access Door Installation:
 - a. Install Thermal Ceramics FastDoor XL, Ductmate, 3M and or equal per manufacturers' instructions, and applicable building code reports and laboratory design listings.
7. Through-Penetration Firestop System:
 - a. When the duct penetrates a concrete or dry wall fire rated floor, ceiling, or wall an approved firestop system shall be employed. 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal insulation shall be installed directly to the duct through the penetration, or terminated on both sides of the penetration depending on the annular space allowance between the duct and the duct opening. When the FireMaster or Pyroscat enclosure system is terminated on both sides of the through penetration, the duct wrap material is mechanically attached to the duct at the termination points using either steel banding or steel pins.

- b. To fire stop the through penetration void area, fill the annular space between the wrapped duct or bare duct and the periphery of the opening with scrap 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal insulation firmly packed into the opening. Compress scrap blanket to percentage stated in the firestop listing for a minimum depth as specified in the firestop listing. Recess packing material below surface on both sides of walls or top side only for floors to the depth stated in the firestop listing. Seal over the packing material using an approved firestop sealant to a depth as stated in the firestop listing, flush with top side of a floor assembly and both sides of a wall assembly.

D. REPAIR PROCEDURES

1. Repair damaged 3M Fire Barrier, FireMaster FastWrap XL, Pyroscat Duct Wrap XL and or equal in accordance with manufacturer's instructions.
2. Remove damaged section by cutting the bands and removing the anchor clips holding it in place. Apply a new section of the same dimension ensuring the same overlap and installation method that existed previously. Cut edges and tears in the foil must be taped with aluminum tape to prevent the insulation from wicking moisture or grease.

E. PROTECTION

1. Protect installed products until completion of project.
2. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 INSTALLATION OF KITCHEN GAS FIRED MAKE-UP AIR UNITS (MAU)

- A. Vibration Control: Refer to Section 230548 and Drawing VC-1, VC-2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in Section 230548 and Drawing VC-1, VC-2.
- B. General: Install units where indicated, in accordance with equipment manufacturer's published installation instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes.
- C. Coordination: Coordinate with other work, including ductwork, floor construction, roof decking, and piping, as necessary to interface installation of units with other work.
- D. Access: Provide access space around units for service as indicated, but in no case less than that recommended by manufacturer.
- E. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
 1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 260000 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment Installer.
- F. Duct Connections: Provide ductwork, accessories, and flexible connections as indicated.
- G. Grounding: Provide positive equipment ground for unit components.

- H. Testing: Upon completion of installation of units, start-up and operate equipment to demonstrate capability and compliance with requirements. Field correct malfunctioning units, then retest to demonstrate compliance.
- I. HVAC subcontractor shall own furnishing and installing new pre and final filters for MAU in Phase 1 work while Phase 2 work is under construction. This Phase 1 unit shall have its filters changed every three months during construction of Phase 2. Once all building construction and air handling system work is complete and before testing, adjusting, and balancing work begins install new pre & final filters. Also provide four additional complete extra sets of pre and final filters for each RTU for attic stock. All these filters indicated above including the four sets of attic stock are additional to those provided for flush out and indoor air quality requirements per NE-CHPS requirements. Obtain receipt from Owner that new filters have been installed at substantial completion and attic stock provided.
- J. Provide one spare set of belts for each belt-driven unit, obtain receipt from Owner that belts have been received. Provide one spare set of belts for each belt-driven air handling unit, obtain receipt from Owner that belts have been received.
- K. Provide the services of a factory-authorized service representative to start-up rooftop units, in accordance with manufacturer's written start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- L. Operating and Maintenance Training:
 - 1. Provide services of manufacturer's service representative (two hours minimum) to instruct Owner's personnel in operation and maintenance of rooftop units. Training shall include start-up and shut-down, servicing and preventative maintenance schedule and procedures, and trouble-shooting procedures plus procedures for obtaining repair parts and technical assistance.
 - 2. Schedule training with Owner, provide at least seven day prior notice to the Architect/Engineer.
- M. GENERAL:
 - 1. Verify all dimensions by field measurements. Verify structure, mounting supports, and membrane installations are completed to the proper point to allow installation of units. Examine rough-in for piping systems to verify actual locations of piping connections prior to installation. Do not proceed until unsatisfactory conditions have been corrected.
 - 2. Install chiller in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- N. FIELD QUALITY CONTROL:
 - 1. Provide the services, to include a written report, of a factory authorized service representative to examine the field assembly of the components, installation, and piping and electrical connections.
- O. DEMONSTRATION:
 - 1. Provide the services of a factory authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below.

2. Start-up service: Place units into operation and adjust controls and safeties. Replace damaged or malfunctioning components and controls.

P. TRAINING:

1. Train the Owner's maintenance personnel on start-up and shut-down procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures.
2. Schedule training with Owner through the Architect/Engineer with at least seven days prior notice.

3.7 INSTALLATION OF POWER AND GRAVITY VENTILATORS

- A. Vibration Control: Refer to Section 230548 and Drawing VC-1, VC-2 for the appropriate support of each piece of HVAC equipment noted as requiring such. The vibration control and seismic restraint manufacturer shall recommend the correct connection and device as outlined in Section 230548 and Drawing VC-1, VC-2.
- B. General: Except as otherwise indicated or specified, install ventilators in accordance with manufacturer's installation instructions and recognized industry practices to insure that products serve the intended function.
- C. Coordinate ventilator work with work of roofing, walls and ceilings, as necessary for proper interfacing.
- D. Ductwork: Connect ducts to ventilators in accordance with manufacturer's installation instruction, and details on drawings.
- E. Roof Curbs: Furnish roof curbs to roofing Installer for installation.
- F. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
 1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
- G. Remove shipping bolts and temporary supports within ventilators. Adjust dampers for free operation.
- H. Testing: After installation of ventilators has been completed, test each ventilator to possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.
- I. Cleaning: Clean factory-finished surface. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- J. General: Furnish to Owner, with receipt, four spare set of belts for each belt driven power ventilator.

3.8 INSTALLATION OF METAL DUCTWORK

A. Installation of Metal Ductwork:

1. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (five percent leakage for systems rated 3 in. and under; one percent for systems rated over 3 in.) and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately with internal surface smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
2. Sealing: All ductwork joints and seams shall be sealed with flexible duct sealer to assure an airtight installation.
3. Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2 in. Fasten to duct and substrate.
 - a. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.
4. Coordination: Coordinate duct installation with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
5. Installation: Install metal ductwork in accordance with "SMACNA HVAC Duct Construction Standards".

B. Installation of Duct Liners:

1. General Install duct liners in accordance with SMACNA "HVAC Duct Construction Standards".

C. Installation of Flexible Ducts:

1. Maximum Length: For any duct run using flexible ductwork, do not exceed 4 ft.-0 in. extended length.
2. Installation: Install in accordance with Section II of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible".

D. Field Quality Control:

1. Leakage Tests: After each duct system that is constructed test for duct leakage in accordance with SMACNA "HVAC Air Duct Leakage Test Manual". Repair leaks and repeat tests until SMACNA requirements are achieved.

E. Equipment Connections:

1. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery.

F. Adjusting and Cleaning:

1. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

2. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until final connections are to be completed.
3. Balancing: Refer to Division 23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork. Seal any leaks in ductwork that become apparent in balancing process.

G. Construction IAQ Management:

1. Follow the SMACNA guidelines for "Duct Cleanliness for New Construction Guidelines" according to advanced levels of cleanliness. Including but not limited to:
 - a. Specify that ductwork be sealed when transported to the construction site
 - b. Store ductwork in clean, dry conditions and keep sealed while it is stored.
 - c. Wipe down internal surfaces of ductwork immediately prior to installation to remove dust.
 - d. Seal open ends on completed ductwork and overnight work-in-progress.
 - e. During installation, protect ductwork waiting to be installed with surface wrapping.
 - f. During construction, seal HVAC supply and return openings to protect them from dust infiltration.

H. Double Wall Grease Duct

1. EXAMINATION
 - a. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - b. If unsatisfactory conditions exist, correct conditions prior to installation.
2. APPLICATION
 - a. Suitable for use in commercial cooking installations for the removal of smoke and grease-laden vapors.
3. INSTALLATION
 - a. Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.
4. CONNECTIONS
 - a. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties. Install the duct system to allow service and maintenance.
 - b. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts.

3.9 INSTALLATION OF DUCTWORK ACCESSORIES

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install turning vanes in square or rectangular 90 degree elbows in supply, return, and exhaust air systems, and elsewhere as indicated.
- C. Install volume and/or splitter damper with adjusting rod in each supply branch. Install according to detail on drawings.

- D. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- E. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.
- F. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.
- G. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
- H. Furnish extra fusible links to owner, one link for every 10 installed of each temperature range; obtain receipt.

3.10 INSTALLATION OF ACOUSTIC DUCT LINING

- A. Installation: All portions of duct designed to receive duct liner shall be completely covered. The smooth, black coated surfaces shall face the airstream. All liners shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported by the side pieces. The liner shall be adhered to the sheet metal with full coverage of an approved adhesive that conforms to ASTM C 916, and all exposed leading edges and transverse joints shall be coated with Permacote factory-applied or field-applied edge coating and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with "Schuller SuperSeal Edge Treatment" or approved adhesive. The liner shall be additionally secured with mechanical fasteners. The pin length should be such as to hold the material firmly in place with minimum compression of the material.

3.11 INSTALLATION OF AIR OUTLETS AND INLETS

- A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function. Provide all necessary brackets, hangers, plenums and flanges as required for a complete and operational system.
- B. Locate diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans" or architectural elevation drawings. Unless otherwise indicated, locate ceiling units in center of acoustical ceiling module.

3.12 INSTALLATION OF FIRESTOP SYSTEMS

- A. General: Install firestop systems at all new and existing fire-rated construction where penetrated by the Work of this Section.
- B. Refer to Section 078413 – Penetration Firestopping, for all installation requirements for maintaining integrity of fire-rated construction at penetrations.

3.13 INSTALLATION OF WALL AND CEILING ACCESS DOORS

- A. General: Install access doors in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.
- B. All access doors shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that the item or part can be easily reached, and the size shall be sufficient for this purpose (minimum size 12 in. X 16in.). Furnish access doors to permit thorough inspection. When access doors are required in corridors, lobbies, or other habitable areas, they shall be located as directed by the Architect.

3.14 AUTOMATIC TEMPERATURE CONTROLS (DDC)

- A. Installation Of Automatic Temperature Controls (DDC):
 - 1. Installation of Control Systems:
 - a. General: Install systems and materials in accordance with manufacturer's instructions, roughing-in drawings and details shown on drawings.
 - b. Control Wiring: Install control wiring, without splices between terminal points, color-coded. Install in neat workmanlike manner, securely fastened. Install in accordance with National Electrical Code.
 - 1) Install circuits over 25-volt with color-coded No. 12 wire in electric metallic tubing.
 - 2) Install circuits under 25-volt with color-code No. 18 wire with 0.031 in. high temperature 105 degrees F. (41 degrees C) plastic insulation on each conductor and plastic sheath over all.
 - 3) Install electronic circuits with color-coded No. 22 wire with 0.023 in. polyethylene insulation on each conductor with plastic-jacketed copper shield over all.
 - 4) Install low voltage circuits, located in concrete slabs, masonry walls, or in mechanical areas, in electrical conduit. Where exposed in occupied areas install all wiring in wiremold.
 - 5) Power sources from lighting circuits and wall outlets shall not be used to power DDC controllers.
 - c. Controllers and safety devices:
 - 1) All safety devices such as freezestats, duct mounted heat detectors, and smoke detectors shall be hard wired to shut down the fans independently. Provide audible alarm with silence switch as well as DDC indication.
 - 2) Humidifier controls shall be hard wired through fan proof flow differential switch and starter auxiliary contacts to disable humidifier system on fan shutdown. Provide DDC indication.
 - 3) All supply, return and exhaust fans shall be provided with pressure differential switches. Current sensing devices, starter auxiliary contacts, and relay contacts are unacceptable proof of fan operation.
 - 4) Primary and standby pumps shall be selectable through the DDC control system. Provide local pilot light to indicate selected pump as well as alarm and silence switch for failed pump. Provide differential pressure switch to prove flow.

2. Adjusting and Cleaning:
 - a. Start-Up: Start-up, test, and adjust DDC control systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
 - b. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.
 - c. Final Adjustment: After completion of installation, adjust thermostats, control valves, motor and similar equipment provided as work of this section.
 - 1) Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.
3. Closeout Procedures:
 - a. Owner's Instructions: Provide services of manufacturer's technical representative for 40 hours of onsite instruction and training on operating, running and basic troubleshooting of DDC control system.
 - b. Validation: The automatic temperature control sub-subcontractor shall completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequence of operation submitted.
 - 1) Witnessed validation demonstration shall consist of:
 - a) Execute digital and analog commands in English and graphic mode.
 - b) Demonstrate all specified diagnostics.
 - c) Demonstrate scan, update, and alarm responsiveness.
 - c. Training:
 - 1) All training shall be by the automatic temperature control sub-subcontractor and shall utilize specified manuals and as-built documentation.
 - 2) Operator training shall include:
 - a) Sequence of Operation review.
 - b) Sign on-Sign off.
 - c) Modifying warning limits, alarm limits and start-stop times.
 - d) System initialization.
 - e) Use of Portable Operators Terminal.
 - f) Troubleshooting of sensors (determining bad sensors).
 - g) Point disable/enable.
 - h) Software review of Sequence of Operation programs.
 - i) Modification of control programs.
 - j) Add/Delete/Modify data points.
 - k) Use of diagnostics.
 - l) Review of initialization.
 - 3) Training shall be for Owner-designated personnel at the subject site, and shall be scheduled by the Owner with two week notice.
 - 4) All training sessions shall be videotaped.

d. Seasonal Site Visits:

In addition to the one year warranty period against component or workmanship defects, 40 hours of training and 40 hours of extra programming as it relates to the control system and as indicated in section 230000, the ATC sub-subcontractor shall provide a seasonal site visit to confirm, verify and modify as required the sequence and/or programming of each piece of equipment to ensure the system is functioning as required and per the sequence of operations. The ATC sub-subcontractor shall provide 16 labor hours per season (four times within a year, total of 64 hours). During each visit they shall, for each piece of equipment confirm operation and functionality, modify and/or repair any control related issues and/or programming and provide training as requested by the owner. This requirement will ensure the equipment/building is operating properly and efficiently as it cycles through each season. These site visits shall begin the following season after substantial completion of the project is issued. Upon substantial completion the engineer of record shall issue four dates to the ATC sub-subcontractor and owner. Signatures and time logs will be kept by both parties to ensure these visits occur.

3.15 TESTING, ADJUSTING, AND BALANCING

A. REQUIREMENTS:

1. Requirements include verification of HVAC system operation, measurement of all system capacity, and establishment of the quantities of the mechanical systems as required to meet specifications, and recording and reporting the results.
2. The entire project is considered phased construction, and as such, as each phase of construction is completed the appropriate balancing for that phase of work shall be completed. At the completion of all phases of construction each previous phase of completed balancing must be re-checked and re-adjusted accordingly to match final design conditions. A preliminary report of each phase of construction will be submitted for approval during each phase of construction, and a final balancing report including all phases of construction will be submitted at the completion of the project.
3. Commission, test, adjust and balance the following mechanical systems:
 - a. Supply air systems.
 - b. Return air systems.
 - c. Exhaust air systems.
 - d. Outside air systems.
 - e. Hydronic heating systems.
 - f. Verify temperature control system operation.
4. Do not include:
 - a. Testing boilers and pressure vessels for compliance with safety code.
 - b. Installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing. Contact Mechanical Subcontractor and the Engineer for direction.

B. Report:

1. Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. General Information and Summary.
 - b. Air Systems.
 - c. Hydronic heating and cooling systems.
 - d. Temperature Control Systems.
2. Contents: Provide the following minimum information, forms and data:
 - a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, General Contractor, HVAC Subcontractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures along with the proof of calibration.
 - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system.
Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

C. QUALITY ASSURANCE:

1. An independent testing, adjusting, and balancing agency certified by the AABC or NEBB as a Test and Balance Engineer in those testing and balancing disciplines required for this project.
2. Codes and Standards:
 - a. AABC: "National Standards For Total System Balance".
 - b. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.
3. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and Mechanical Subcontractor. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.
4. System Operation: Systems shall be fully operational prior to beginning procedures. All new automatic temperature controls shall be fully operational. Test, adjust and balance the air systems before refrigerant systems. Test, adjust and balance air conditioning systems during summer season, and heating systems during winter season, including at least a period of operation at outside conditions within 5E F. wet bulb temperature of maximum summer design condition, and within 10E F. dry bulb temperature of minimum winter design condition. Take final temperature reading during seasonal operation.

D. PRELIMINARY PROCEDURES:

1. Air Systems:
 - a. Obtain drawings and become thoroughly acquainted with the systems.
 - b. Compare drawings to installed equipment and field installations.
 - c. Walk the system from the system air handling equipment to terminal units to determine variations in installation.
 - d. Check filters for cleanliness.
 - e. Check all dampers (volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
 - f. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a cross check with required fan volumes.
 - g. Determine best locations in main and branch ductwork for most accurate duct traverses. Traverses shall be performed in each supply and return duct main and sub-mains for each AHU and return air fan.
 - h. Place outlet dampers in the full open position.
 - i. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
 - j. Verify lubrication of all motors and bearings.
 - k. Check fan belt tension.
 - l. Check fan rotation.
2. Hydronic Systems:
 - a. Open valves to full open position. Close coil bypass valves.
 - b. Remove and clean all strainers.
 - c. Examine hydronic systems and determine if water has been treated and cleaned.
 - d. Check pump rotation.
 - e. Check expansion tanks to verify noted air pressure and that the system is completely full of water.
 - f. Check air vents at high points of system and determine if all are installed and operating freely.
 - g. Set temperature controls so all coils are calling for full flow.
 - h. Check operation of automatic bypass valves.
 - i. Check and set operating temperatures of chillers, boilers, and heat exchangers to design requirements.
 - j. Verify lubrication of all motors and bearings.
3. Measurements:
 - a. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerance specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
 - b. Provide instruments meeting the specifications of the referenced standards.
 - c. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
 - d. Apply instrument as recommended by the manufacturer.
 - e. Use instruments with minimum scale and maximum subdivisions and with scaled ranges proper for the value being measured.
 - f. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
 - g. Take all reading with the eye at the level of the indicated value to prevent parallax.

- h. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.
 - i. Take measurements in the system where best suited to the task.
- E. Performing Testing, Adjusting, and Balancing:
 - 1. Test, adjust and balance all noted systems according to SMACNA standards and as follows:
 - a. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
 - b. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
 - c. Patch insulation, ductwork, and housings, using materials identical to those removed.
 - d. Seal ducts and test for and repair leaks.
 - e. Seal insulation to re-establish integrity of the vapor barrier.
 - f. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
 - g. Retest, adjust and balance system subsequent to significant system modifications, and resubmit test results.
 - 2. System Deficiencies:
 - a. The Balancing Sub-subcontractor shall advise the Mechanical Subcontractor and the Engineer of all system deficiencies in writing. Report all motors not running, missing dampers, inoperative valves and controls, or lack of access.
 - b. Upon completion of system deficiencies, Balancing Sub-subcontractor shall balance and record data again at no additional costs to the project/owner.
 - c. Any re-balancing required to meet the desired CFM or modified CFM due to system modifications or owner changes shall be provided at no additional costs to the project/owner.
 - d. The Balancing Sub-subcontractor shall provide the necessary sheave and belt changes to motors and fans as required to achieve the desired CFM at no additional costs to the project/owner.

END OF SECTION

SECTION 23 05 48 - VIBRATION CONTROL

PART 1 - GENERAL 1

1.01 GENERAL PROVISIONS 1

1.02 DESCRIPTION 1

1.03 SUBMITTAL DATA REQUIREMENTS..... 3

1.04 CODE AND STANDARDS REQUIREMENTS 3

1.05 MANUFACTURER'S RESPONSIBILITY..... 3

1.06 RELATED WORK 4

1.07 DESIGN REQUIREMENTS 4

1.08 QUALITY ASSURANCE 4

PART 2 - PRODUCTS 5

2.01 INTENT 5

2.02 PRODUCT DESCRIPTIONS..... 5

PART 3 - EXECUTION 13

3.01 GENERAL..... 13

3.02 VIBRATION ISOLATION AND RESTRAINT OF PIPING, DUCTWORK, AND CONDUIT 14

3.03 SEISMIC RESTRAINT EXCLUSIONS 17

3.04 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT 18

END OF INDEX

SECTION 23 05 48 - VIBRATION CONTROL

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 DESCRIPTION

- A. General: The work noted within section 23 05 48 is referenced by divisions 23 00 00. Provide all necessary labor and material in each division as required herein.
- B. Intent:
 - 1. All mechanical, plumbing, fire protection and electrical equipment, piping, and ductwork shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
 - 2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
 - 3. All such systems must be installed in strict accordance with component manufacturer's, and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
 - 4. This specification is considered to be minimum requirements for consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).
 - 5. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.
- C. The work in this section includes, but is not limited to the following:
 - 1. Vibration isolation for piping, ductwork and equipment.
 - 2. Equipment isolation bases.
 - 3. Flexible piping connections.
 - 4. Restraints for isolated equipment.
 - 5. Restraints for non-isolated equipment.
 - 6. Restraint designs and installation supervision.
 - 7. Attachment of housekeeping pads.

8. All mechanical, plumbing, fire protection and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included. Equipment referred to below is typical. (Equipment not listed is still included in this specification).

AC Units	Generators
Air Cooled Condensing Units	Heat Exchangers
Air Handling Units	Light Fixtures
Air Separators	Motor Control Ctrs
Battery Racks	Piping
Boilers	Pumps (all types)
Bus Ducts	Rooftop Units
Cable Trays	Switching Gear
Chillers	Tanks (all types)
Comp. Room Units	Transformers
Conduit	Unit Heaters
Ductwork	Unit Substations
Dust Collectors	Var. Freq. Drives
Electrical Panels	VAV Boxes
Fans (all types)	Water Heaters

D. Definitions:

1. Life Safety Systems

- a. All systems involved with fire protection including sprinkler piping, fire pumps, jockey pumps, fire pump control panels, service water supply piping, water tanks, fire dampers and smoke exhaust systems.
- b. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers, and all flowpaths to fire protection and/or emergency lighting systems.
- c. All medical and life support systems.
- d. Fresh air & relief systems on emergency control sequence including air handlers, conduit, duct, dampers, etc.

2. Positive Attachment

- a. A positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of overhead piping, ductwork, fire protection, electrical conduit, bus duct, or cable trays, etc. are not acceptable as anchor points.

3. Transverse Bracing

- a. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe, duct or conduit.
- 4. Longitudinal Bracing
 - a. Restraint(s) applied to limit motion parallel to the centerline of the pipe, duct or conduit.

1.3 SUBMITTAL DATA REQUIREMENTS

- A. In addition to requirements of SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS, the manufacturer of vibration isolation shall provide submittals for products as follows:
 - 1. Descriptive Data
 - a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
 - b. Detailed schedules of flexible and rigidly mounted equipment, showing vibration isolators by referencing numbered descriptive drawings.
 - 2. Shop Drawings
 - a. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
 - b. Provide all details of suspension and support for ceiling hung equipment.
 - c. Where walls, floors, slabs or supplementary steel work are used for restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads at all attachment and support points.

1.4 CODE AND STANDARDS REQUIREMENTS

- A. Typical Applicable Codes, Standards, and Categories:
 - 1. International Building Code 2015 with an effective peak acceleration coefficient of 0.15.
 - 2. Massachusetts State Building Code, Ninth Edition.

1.5 MANUFACTURER'S RESPONSIBILITY

- A. Manufacturer of vibration isolation equipment shall have the following responsibilities:
 - 1. Determine vibration isolation restraint sizes and locations.
 - 2. Provide vibration isolation.
 - 3. Provide calculations and materials if required for restraint of unisolated equipment.
 - 4. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.

1.6 RELATED WORK

A. Housekeeping Pads:

1. Housekeeping pads shall be coordinated with restraint vendor and sized to provide a minimum edge distance of ten (10) bolt diameters all around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings. If cast-in anchors are to be used, the housekeeping pads shall be sized to accommodate the ACI requirements for bolt coverage and embodiment.

B. Supplementary Support Steel:

1. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment.

C. Attachments:

1. Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor's calculations.

1.7 DESIGN REQUIREMENTS

- A. Design isolators for equipment installed outdoors to provide adequate restraint to withstand the force of a 100 mph wind applied to any exposed surface of the isolated equipment. Isolators for outdoor equipment shall have bolt holes for attachment to equipment and to supports. The vibration isolation Vendor shall submit verifying shear and over turning calculations, for their product and equipment installation arrangement, stamped by a licensed Professional Engineer. The design and supply of miscellaneous support steel above and below isolators will not be the responsibility of the vibration isolation manufacturer.

1.8 QUALITY ASSURANCE

- A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with other trades. Coordinate plan dimensions with size of housekeeping pads.
- B. Provide vibration isolators of the appropriate sizes, with the proper loading to meet the specified deflection requirements.
- C. Supply and install any incidental materials such as mounting brackets, attachments and other accessories as may be needed to meet the requirements stated herein, even if not expressly specified or shown on the drawings, without claim for additional payment.
- D. Verify correctness of equipment model numbers and conformance of each component with manufacturer's specifications.

- E. Should any rotating equipment cause excessive noise or vibration when properly installed on the specified isolators, the Contractor shall be responsible for rebalancing, realignment, or other remedial work required to reduce noise and vibration levels. Excessive is defined as exceeding the manufacturer's specifications for the unit in question.

PART 2 PRODUCTS

2.1 INTENT

- A. All vibration isolators restraints described in this section shall be the product of a single manufacturer. Mason Industry's products are the basis of these specifications; products of other manufacturers are acceptable provided their systems strictly comply with the specification.
- B. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8 inch and/or horizontal permanent deformation greater than 1/4 inch.

2.2 PRODUCT DESCRIPTIONS

- A. Vibration Isolators.
GENERAL:

1. All metal parts installed out-of-doors shall be corrosion resistant after fabrication. Galvanizing shall meet ASTM Salt Spray Test Standards and Federal Test Standard No. 14.
2. Isolators installed out-of-doors shall have base plates with bolt holes for fastening the isolators to the support members.
3. Isolator types are scheduled to establish minimum standards. At the Contractor's option, labor-saving accessories can be an integral part of isolators supplied to provide initial lift of equipment to operating height, hold piping at fixed elevations during installation and initial system filling operations, and similar installation advantages. Accessories and features must not degrade the isolation performance of the isolators.
4. Static deflection of isolators shall be as provided in the EXECUTION section and as shown on the drawings. All static deflections stated are the minimum acceptable deflection for the mounts under actual load. Isolators selected solely on the basis of rated deflections are not acceptable and will be disapproved.

SPECIFICATION:

1. Two layers of 3/4" thick neoprene pad consisting of 2" square waffle modules separated horizontally by a 16 gauge galvanized shim. Load distribution plates shall be used as required. Pads shall be Type Super "W" as manufactured by Mason Industries, Inc.

2. Bridge-bearing neoprene mountings shall have a minimum static deflection of 0.2" and all directional capability. The mount shall consist of a ductile iron casting containing two separated and opposing molded neoprene elements. The elements shall prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation. The shock absorbing neoprene materials shall be compounded to bridge-bearing specifications. Mountings shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Mountings shall be Type BR as manufactured by Mason Industries, Inc.
3. Sheet metal panels shall be bolted to the walls or supporting structure by assemblies consisting of a neoprene bushing cushioned between 2 steel sleeves. The outer sleeve prevents the sheet metal from cutting into the neoprene. Enlarge panel holes as required. Neoprene elements pass over the bushing to cushion the back panel horizontally. A steel disc covers the inside neoprene element and the inner steel sleeve is elongated to act as a stop so tightening the anchor bolts does not interfere with panel isolation in 3 planes. Bushing assemblies can be applied to the ends of steel cross members where applicable. All neoprene shall be bridge bearing quality. Bushing assemblies shall be type PB as manufactured by Mason Industries, Inc.
4. A one (1) piece molded bridge bearing neoprene washer/bushing. The bushing shall surround the anchor bolt and have a flat washer face to avoid metal to metal contact. Neoprene bushings shall be type HG as manufactured by Mason Industries, Inc.
5. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or 1/4" neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height. Mountings shall be Type SLF as manufactured by Mason Industries, Inc.
6. Restrained spring mountings shall have an SLF mounting as described in Specification 5, within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Since housings will be bolted or welded in position there must be an internal isolation pad. Housing shall be designed to resist all forces. Mountings shall have Anchorage Pre-approval "R" Number from OSHPD in the state of California certifying the maximum certified horizontal and vertical load ratings. Mountings shall be SLR as manufactured by Mason Industries, Inc.
7. Spring mountings as in specification 5 built into ductile iron or steel housing to provide all directional snubbing. The snubber shall be adjustable vertically and allow a maximum of 1/4 inch travel in all directions before contacting the resilient snubbing collars. Mountings shall have an Anchorage Pre-approval "R" number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Mountings shall be SSLFH as manufactured by Mason Industries, Inc.

8. Air Springs shall be manufactured with upper and lower steel sections connected by a replaceable flexible nylon reinforced neoprene element. Air spring configuration shall be multiple bellows to achieve a maximum natural frequency of 3 Hz. Air Springs shall be designed for a burst pressure that is a minimum of three times the published maximum operating pressure. All air spring systems shall be connected to either the building control air or a supplementary air supply and equipped with three leveling valves to maintain leveling within plus or minus 1/8". Submittals shall include natural frequency, load and damping tests performed by an independent lab or acoustician. Air Springs shall be Type MT and leveling valves Type LV as manufactured by Mason Industries, Inc.
9. Restrained air spring mountings shall have an MT air spring as described in Specification 8, within a rigid housing that includes vertical limit stops to prevent air spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" shall be maintained around restraining bolts and between the housing and the air spring so as not to interfere with the air spring action. Limit stops shall be out of contact during normal operation. Housing shall be designed to resist all forces. Mountings shall be SLR-MT as manufactured by Mason Industries, Inc.
10. Hangers shall consist of rigid steel frames containing minimum 1 1/4" thick neoprene elements at the top and a steel spring with general characteristics as in specification 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30° capability. Hangers shall be type 30° as manufactured by Mason Industries, Inc.
11. Hangers shall be as described in specifications 10, but they shall be pre-compressed and locked at the rated deflection by means of a upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30° capability. Hangers shall be type PC30N as manufactured by Mason Industries, Inc.
12. Cable Restraints shall consist of galvanized steel aircraft cables sized to resist loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges. Cable assemblies shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified load ratings. Cable assemblies shall be Type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and the clevis or SCBV if clamped to a beam all as manufactured by Mason Industries, Inc.

13. Solid braces shall consist of steel angles or channels to resist loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Solid brace assembly shall have anchorage pre-approval "R" number from OSHPD in the state of California verifying the maximum certified load ratings. Solid brace assemblies shall be type SSB as manufactured by Mason Industries, Inc.

Note: Specifications 12 - 14 apply to trapeze as well as clevis hanger locations. At trapeze anchor locations piping must be shackled to the trapeze. Specifications apply to hanging equipment as well.

14. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California. Rod clamp assemblies shall be Type SRC as manufactured by Mason Industries, Inc.
15. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose performed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross braces shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.
16. All-directional snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4 inch thick. Rated loading shall not exceed 1,000 psi. A minimum air gap of 1/8 inch shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to insure no short circuits exist before systems are activated. Snubbers shall have an Anchorage Pre-approval "R" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings. Snubber shall be Type Z-1 225 as manufactured by Mason Industries, Inc.
17. All directional snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum of 3/4" thick. Rated loadings shall not exceed 1,000 psi. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" nor more than 1/4". Snubbers shall be installed with factory set clearances. The capacity of the snubber at 3/8" deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable "G" force. Submittals shall include the load deflection curves up to 1/2" deflection in the x, y and z planes. Snubbers shall have an anchorage pre-approval "R" number from OSHPD in the state of California verifying the maximum certified horizontal and vertical load ratings. Snubbers shall be series Z-101 1 as manufactured by Mason Industries, Inc.

18. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads. Drill-in stud wedge anchors shall be type SAS as manufactured by Mason Industries, Inc.
19. Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load. Female wedge anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads. Drill-in female wedge anchors shall be type SAB as manufactured by Mason Industries, Inc.
20. Vibration isolation manufacturer shall furnish integral structural steel bases. Rectangular bases are preferred for all equipment. Centrifugal refrigeration machines and pump bases may be T or L shaped where space is a problem. Pump bases for split case pump shall include supports for suction and discharge elbows. All perimeter members shall be steel beams with a minimum depth equal to 1/10 of the longest dimension of the base. Base depth need not exceed 14' provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1 ". Bases shall be type WF as manufactured by Mason Industries, Inc.
21. Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating and inertia foundations. Bases for split case pumps shall be large enough to provide for suction and discharge elbows. Bases shall be a minimum of 1/1 2 of the longest dimension of the base but not less than 6". The base depth need not exceed 1 2" unless specifically recommended by the base manufacturer for mass or rigidity. Forms shall include minimum concrete reinforcing consisting of 1/2" bars welded in place on 6" centers running both ways in a layer 1 1/2" above the bottom. Forms shall be furnished with steel templates to hold the anchor bolts sleeves and anchors while concrete is being poured. Height saving brackets shall be employed in all mounting locations to maintain a 1 " clearance below the base. Wooden formed bases leaving a concrete rather than a steel finish are not acceptable. Base shall be type BMK or K as manufactured by Mason Industries, Inc.
22. Roof Curb (by HVAC Contractor)
 - a. Curb mounted rooftop equipment shall be mounted on structural spring isolation curbs that bear directly on the roof support structure, and are flashed and waterproofed into the roof's membrane waterproofing system. All spring locations shall have removable waterproof covers to allow for spring adjustment and/or removal. Springs shall be Type A.
 - b. Unit shall be provided with wood nailer and flashing.
 - c. Curbs shall meet all NRCA Standards.
 - d. Curbs shall be similar to Novia Associates VibCurb III or equal having a minimum 3" rated static deflection or approved equal.

- e. Vibration control: The spring roof curb shall have the top isolated or floating rail attached in a manner to the fixed lower portion of the curb without short circuiting or bridging between the two. Restraining bolt(s) or threaded rod shall be of sufficient size to withstand the applied wind & or force at each spring pack location.
- f. An alignment bolt shall be installed before connecting the floating to non-floating parts to guarantee perfect centering of the restraining bolts.
- g. Weather proofing & air seal: The spring curb must keep the weather (air and water) out and any airflow from the RTU in. The weather seal must not have the ability to fail and allow water or air into the building.
- h. The use of exposed exterior neoprene or some other elastomer material to seal the top floating rail from the base of the curb in not acceptable.
- i. Vibration Mountings: Provide a rubber gasket covered by formed galvanized sheet metal top flashing that overhangs the top wood nailer and galvanized bottom flashing. The overlapping shall effectively cover the rubber gasket so it is protected from the elements.
- j. The top flashing / support rail shall be 14 ga. G60–Zc steel formed with 90 bends that extend down to the wood nailer. Provide a counter flashing member with a sponge gasket attached that presses up against the horizontal bend. The seal shall be replaceable, protected from the elements and easy to install.
- k. Curb side material: Provide 12 Ga. G60 galvanized steel for curb side construction. All side and end seam between sheets shall be continuously welded, corner joints to be caulked and bolted.
- l. Structural Capability:
 - 1) Curbs shall be installed on metal decking/concrete slab. Air handling unit load shall be properly distributed. Coordinate curb construction with pitch of roof. Curbs shall be built to match the roof pitch in accordance with all requirements of this project. Positive attachment of the curb to the structure is imperative. Pitch correction shall be fabricated from 12 gauge galvanized material and be continuous on all sides and ends. Field fabricated and installed tube steel stub-ups are not acceptable. HVAC contractor shall provide detailed information to the curb manufacturer regarding pitch correction.
 - 2) Plenum Sections: The side material must be capable of handling the static pressure developed by the fans and not ‘oil can’. Provide spanning bar joists as required to support plenum installation (even when the spring pockets are center span).
 - 3) Provide a continuous bottom tube steel member or side material of sufficient strength. Mechanical contractor shall coordinate and verify all dimensions, weights, roof penetrations, etc. with the Structural Engineer prior to installation.

- 4) Curb Insulation: Provide spring curbs with a space between the floating and non-floating parts for the installation of insulation. Curb manufacturer shall provide factory installed insulation adhered to roof curb. Curbs shall be externally factory insulated with a 1.7" thick R-12 foam insulation, FM Class 1 and UL Class A Ratings, with bonded fiber reinforced facer.
- m. Protection: Curbs shall be completely shrink-wrapped during shipping.
- n. Mechanical contractor shall provide all necessary materials to completely weather proof and sound proof the curb installation.
- o. Additional features:
 - 1) Sound barrier: Provide a sound barrier package, consisting of G60 galvanized back-to-back angles. Sound barrier package shall be capable of supporting two layers of 1/2" Durock concrete board with a maximum deflection over the width of the curb of L/360. Durock furnished and installed by the HVAC Contractor. Overlap all joints, caulk all seams and edges. Transmission Loss & STC shall be as shown as follows. Sound Transmission Loss at Frequency (Cycles per second) of (125)=20, (250)=27, (500)=30, (1000)=32, (2000)=30, (4000)=38, (STC)=31.
 - 2) Provide with framed Supply & Return air duct openings. Openings shall match duct sizes and have 1" galvanized steel flanges.
 - 3) Plenum sections: Where indicated on the drawings, provide in the interior of the curb, double wall acoustical floor, walls and plenum divider. All insulation shall be 2" thick fiber glass acoustical duct liner with reinforced coating system. Insulation acoustical performance shall be as follows. Liner shall not support microbial growth and shall be EPA registered and pass ASTM C 1071 & ASTM G21 bacterial tests conducted in accordance with ASTM G22. Floors up to 90" curb I.D. width shall be constructed of 22 Ga., 20 Ga. thereafter, solid G60 galvanized bottom panels and 22 Ga. galvanized perforated 22.7% open area top panel. Floor shall be attached to walls and plenum divider to provide an airtight plenum. Walls shall have 22 Ga. galvanized perforated 22.7% open area inside panels. Plenum divider shall be double wall 22 Ga. perforated galvanized 22.7% open area panel on the supply side with a 14 gauge solid panel opposite. Sound Absorption Coefficient at Frequency (Cycles per second) of (125)=.23, (250)=.64, (500)=.99, (1000)=1.05, (2000)=1.00, (4000)=.98, (NRC)=.90,

23. Flexible spherical expansion joints shall employ peroxide cured EPDM in the covers, liners and Dacron tire cord friction ring. Solid steel rings shall be used within the raised face rubber ends to prevent pullout. Flexible cable bead wire is not acceptable. Sizes 2" and larger shall have two spheres reinforced with a ring between spheres to maintain shape and complete with split ductile iron or steel flanges with hooked or similar interlocks. Sizes 16' to 24" may be single sphere. Sizes 3/4" to 1 1/2" may have threaded bolted flange assemblies, one sphere and cable retention. 14" and smaller connectors shall be rated at 250 psi up to 190°F. with a uniform drop in allowable pressure to 190 psi at 250°F. 16" and larger connectors are rated 180 psi at 190°F. and 135 psi at 250°F. Safety factors to burst and flange pullout shall be a minimum of 3/1. All joints must have permanent markings verifying a 5 minute factory test at twice the rated pressure. Concentric reducers to the above specifications may be substituted for equal ended expansion joints.
- Expansion joints shall be installed in piping gaps equal to the length of the expansion joints under pressure. Control rods need only be used in unanchored piping locations where the manufacturer determines the installation exceeds the pressure requirement without control rods, as control rods are not desirable in work. If control rods are used, they must have 1/2" thick Neoprene washer bushings large enough in area to take the thrust at 1000 psi maximum on the washer area. Expansion joints shall be installed on the equipment side of the shut off valves.
- Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer. All expansion joints shall be installed on the equipment side of the shut off valves. Expansion joints shall be SAFEFLEX SFDEJ, SFEJ, SFDJR or SFU and Control Rods CR as manufactured by Mason Industries, Inc.
24. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" and larger shall be flanged. Smaller sizes shall have male nipples. Minimum lengths shall be as tabulated:

<u>Flanged</u>		<u>Male Nipples</u>	
3 x 14	10 x 26	1/2 x 9	1-1/2 x 13
4 x 15	12 x 28	3/4 x 10	2 x 14
5 x 19	14 x 30	1 x 11	2-1/2 x 18
6 x 20	16 x 32	1-1/4 x 12	
8 x 22			

Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible. Hoses shall be type BSS as manufactured by Mason Industries, Inc.

25. All-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by a minimum 1/2" thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi and the design shall be balanced for equal resistance in any direction. All-directional anchors shall be type ADA as manufactured by Mason Industries, Inc.

26. Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum 1/2" thickness of 60 durometer neoprene. The height of the guides shall be preset with a shear pin to allow vertical motion due to pipe expansion or contraction. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of $\pm 1 \frac{5}{8}$ " motion, or to meet location requirements. Pipe guides shall be type VSG as manufactured by Mason Industries, Inc.
27. Split Wall Seals consist of two bolted pipe halves with minimum 3/4" thick neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1" past either face of the wall. Where temperatures exceed 240°F., 10# density fiberglass may be used in lieu of the sponge. Seals shall be Type SWS as manufactured by Mason Industries, Inc.
28. The horizontal thrust restraint shall consist of a spring element in series with a neoprene molded cup as described in specification 5 with the same deflection as specified for the mountings or hangers. The spring element shall be designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" movement at start and stop. The assembly shall be furnished with 1 rod and angle brackets for attachment to both the equipment and the duct work or the equipment and the structure. Horizontal restraints shall be attached at the centerline of thrust and symmetrical on either side of the unit. Horizontal thrust restraints shall be type WBI/WBD as manufactured by Mason Industries, Inc.

PART 3 EXECUTION

3.1 GENERAL

- A. All vibration isolators and restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data. At the completion of all construction work the vibration and device supplier shall inspect all installations and provided a written report of installation compliance to the engineer of record. A copy of this written certification shall also be provided in the operations manual provided to the owner.
- B. Installation of vibration isolators and restraints must not cause any change of position of equipment, piping or duct work resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.
- D. The contractor shall not install any equipment, piping, duct or conduit which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.
- E. Coordinate work with other trades to avoid rigid contact with the building.
- F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers

attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractors expense.

- G. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractors expense.
 - H. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractors expense.
 - I. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
 - 1. Flanges of structural beams.
 - 2. Upper truss cords in bar joist construction.
 - 3. Cast in place inserts or wedge type drill-in concrete anchors.
 - J. Specification 12 cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.
 - K. Specification 12 cable assemblies are installed taut on non-isolated systems. Specification 13 solid braces may be used in place of cables on rigidly attached systems only.
 - L. At locations where specification 12 or 13 restraints are located, the support rods must be braced when necessary to accept compressive loads with specification 14 braces.
 - M. At all locations where specification 12 or 13 restraints are attached to pipe clevis's, the clevis cross bolt must be reinforced with specification type 15 braces.
 - N. Drill-in concrete anchors for ceiling and wall installation shall be specification type 18, and specification type 19 female wedge type for floor mounted equipment.
 - O. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project.
 - P. Hand built elastomeric expansion joints may be used when pipe sizes exceed 24" or specified movements exceed specification 23 capabilities.
 - Q. Where piping passes through walls, floors or ceilings the vibration isolation manufacturer shall provide specification 27 wall seals.
 - R. Air handling equipment and centrifugal fans shall be protected against excessive displacement which results from high air thrust in relation to the equipment weight. Horizontal thrust restraint shall be specification type 28.
 - S. Locate isolation hangers as near to the overhead support structure as possible.
- 3.2 VIBRATION ISOLATION AND RESTRAINT OF PIPING, DUCTWORK, AND CONDUIT

- A. Where piping connects to rotating or vibrating mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.
- B. Restraint of Piping:
1. Restrain all piping listed as a, b or c below. Use specification 12 cables.
 - a. Fuel oil piping, gas piping, medical gas piping, and compressed air piping.
 - b. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1 1/4" I.D. and larger.
 - c. All other piping 2-1/2" diameter and larger.
 2. Transverse piping restraints shall be at 40' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 3. Longitudinal restraints shall be at 80' maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
 5. For fuel oil and all gas piping transverse restraints must be at 20' maximum and longitudinal restraints at 40' maximum spacing.
 6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" of the elbow or TEE or combined stresses are within allowable limits at longer distances.
 7. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
 8. Branch lines may not be used to restrain main lines.
- C. Pipe Isolation
1. All chilled water, condenser water, hot water, steam, refrigerant, drain and engine exhaust piping that is connected to vibration-isolated equipment shall be isolated from the building structure within the following limits:
Within mechanical rooms;
Within 50' total pipe length of connected vibration-isolated equipment (chillers, pumps, air handling units, pressure reducing stations, etc.);
At every support point for piping that is greater than 4 inches in diameter.
 2. Piping shall be isolated from the building structure by means of vibration isolators, resilient lateral supports, and resilient penetration sleeve/seals.
 3. Isolators for the first three support points adjacent to connected equipment shall achieve one half the specified static deflection of the isolators supporting the connected equipment. When the required static deflection of these isolators is greater than 1/2", Type FSN or HSN isolators shall be used. When the required static deflection is less than or equal to 1/2", Type FN or HN isolators shall be used. All other pipe support isolators within the specified limits shall be either Type FN or HN achieving at least 1/4" static deflection.

4. Where lateral support of pipes is required within the specified limits, this shall be accomplished by use of resilient lateral supports.
5. Pipes within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.
6. Provide flexible pipe connections as called for under Major Equipment above and wherever shown on the drawings.

D. Restraint of ductwork:

1. Restrain all duct work with specification 12 or 13 restraints as listed below:
 - a. Restrain rectangular ducts with cross sectional area of 6 sq. ft. or larger.
 - b. Restrain round ducts with diameters of 28" or larger.
 - c. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.
2. Transverse restraints shall occur at 30' intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct turn and at each end of a duct run.
3. Longitudinal restraints shall occur at 60' intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4' of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
4. The ductwork must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.
5. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
6. Walls, including gypsum board non bearing partitions, which have ducts running through them may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.

E. Duct Isolation:

1. All sheet metal ducts and air plenums that are within mechanical rooms or within a distance of 50' total duct length of connected vibration-isolated equipment (whichever is longer) shall be isolated from the building structure by Type FN, PCF or HN isolators. All isolators shall achieve 0.1" minimum static deflection.
2. Ducts within the specified limits that penetrate the building construction shall be isolated from the building structure by use of resilient penetration sleeve/seals.
3. Flexible duct connections shall be provided as called for above under Major Equipment and wherever shown on the drawings.

F. Restraint of Electrical Services:

1. All electrical conduit 2-1/2" in diameter and larger shall be restrained with specification type 12 cable restraints or specification type 13 for solid brace restraints.
2. All electrical bus ducts, cable trays and ladder trays shall be restrained with specification type 12, cable restraints or specification 13 solid brace restraints.
3. Transverse restraints shall occur at 30' intervals or both ends if the electrical run is less than the specified interval. Transverse restraints shall be installed at each electrical services turn and at each end of the electric run.
4. Longitudinal restraints shall occur at 60' intervals with at least one restraint per electric run. Transverse restraints for one electric section may also act as a longitudinal restraint for a duct for an electric section connected perpendicular to it if the restraints are installed within 4' of the intersection of the electric run and if the restraints are sized for the larger electric run.
5. All rigid floor mounted equipment must have a resilient media between the equipment mounting hole and the anchor bolt. Neoprene bushings shall be specification type 4 and anchor bolts shall be specification type 18 or 19.
6. Wall mounted panels shall be mounted with specification type 3 bushings. Floor mounted panels shall be mounted on specification type 4 bushings. Anchor bolts shall be specification type 18 or 19.

G. All fire protection piping shall be braced in accordance with NFPA 13 and 14.

H. All mechanical equipment shall be vibration isolated and restrained.

1. All fire protection equipment is considered life safety equipment and shall be restrained.

3.3 RESTRAINT EXCLUSIONS

A. Mechanical and electrical Components to be installed within design category "B" shall be exempt from the seismic requirements within this specification in accordance with ASCE-7 (2010). Refer to the Structural Drawings and Specifications for Project Design Category.

B. Piping:

1. All piping less than 2 1/2" except for gas and fire protection piping.
2. All piping in boiler and mechanical equipment rooms less than 1 1/4" I.D.
3. All clevis or trapeze supported piping suspended from hanger rods where the point of attachment is less than the 12" in length from the structure to the structural connection of the clevis or trapeze.
4. All PVC and fiberglass suspended waste or vent pipe 6" in diameter and smaller.

C. Ductwork:

1. Rectangular, square or oval ducts less than 6 sq.ft. in cross sectional area.
2. Round duct less than 28" in diameter.
3. Duct supported by hanger rods where the point of attachment is less than 12" in length from the structure to the structural connection of the duct work.

D. Electrical:

1. All conduit less than 2 1/2" diameter suspended by individual hanger rods.
2. All clevis or trapeze supported conduits suspended by hanger rods where the point of attachment is less than 1 2" in length from the structure to the structural connection of the clevis or trapeze.

3.4 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT

A. General

1. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment as well as for proper operation.
2. Installation of vibration isolation equipment shall be in accordance with the manufacturer's instructions.

B. Isolators

1. All vibration isolators shall be aligned squarely above or below mounting points of the supported equipment.
2. Isolators for equipment with bases shall be located on the sides of the bases which are parallel to the equipment shaft unless this is not possible because of physical constraints.
3. Locate isolators to provide stable support for equipment, without excess rocking. Consideration shall be given to the location of the center of gravity of the system and the location and spacing of the isolators. If necessary, a base with suitable footprint shall be provided to maintain stability of supported equipment, whether or not such a base is specifically called for herein.
4. If a housekeeping pad is provided, the isolators shall bear on the housekeeping pad and the isolator base plates shall rest entirely on the pad.
5. Hanger rods for vibration-isolated support shall be connected to major structural members, not the floor slab between major structural members. Provide suitable intermediate support members as necessary.
6. Vibration isolation hanger elements shall be positioned as high as possible in the hanger rod assembly, but not in contact with the building structure, and so that the hanger housing may rotate a full 360° about the rod axis without contacting any object.
7. Parallel running pipes may be hung together on a trapeze that is isolated from the building. Isolator deflections must be the greatest required by the provisions for pipe isolation for any single pipe on the trapeze. Do not mix isolated and unisolated pipes on the same trapeze.
8. Pipes, ducts and equipment shall not be supported from other pipes, ducts and equipment.
9. Resiliently isolated pipes, ducts and equipment shall not come in rigid contact with the building construction or rigidly supported equipment.
10. The installed and operating heights of equipment supported by Type FSNTL isolators or with Type RC-2 isolation bases shall be identical. Limit stops shall be out of contact during normal operation. Adjust isolators to provide 1/4" clearance between the limit stop brackets and the isolator top plate, and between the travel limit nuts and travel limit brackets.
11. Adjust all leveling bolts and hanger rod bolts so that the isolated equipment is level and in proper alignment with connecting ducts or pipes.

C. Bases

1. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. This provision shall apply whether or not a base frame is called for on the schedule. In the case that a base frame is required for the unit because of the equipment manufacturer's requirements and is not specifically called for on the equipment schedule, a base frame recommended by the equipment manufacturer shall be provided at no additional expense.
2. Unless otherwise indicated, there is to be a minimum operating clearance of 1" between steel rails, steel frame bases or inertia bases and the floor beneath the equipment. The isolator mounting brackets shall be positioned and the isolators adjusted so that the required clearance is maintained. The clearance space shall be checked by the Contractor to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
3. Isolation bases shall be installed in strict accordance with the manufacturer's instructions.

D. Flexible Duct Connections:

1. Prior to installation of the flexible connection, sheet metal ducts and plenum openings shall be squarely aligned with the fan discharge, fan intake, or adjacent duct section, and the gap between connected parts shall be uniform. Flexible duct connections shall not be installed until this provision is met. There shall be no metal-to-metal contact between connected sections, and the fabric shall not be stretched taut.

E. Flexible Pipe Connections:

1. Install flexible pipe connections in strict accordance with the manufacturer's instructions.

F. Thrust Restraints:

1. Thrust restraints shall be attached on each side of the fan parallel to the thrust force. This may require custom brackets or standoffs. The body of the thrust restraint shall not come in contact with the connected elements. Thrust restraints shall be adjusted to constrain equipment movement to the specified limit.

G. Grommets:

1. Where grommets are required at hold down bolts of isolators, bolt holes shall be properly sized to allow for grommets. The hold down bolt assembly shall include washers to distribute load evenly over the grommets. Bolts and washers shall be galvanized.

H. Resilient Penetration Sleeve/Seals:

1. Maintain an airtight seal around the penetrating element and prevent rigid contact between the penetrating element and the building structure. Fit the sleeve tightly to the building construction and seal airtight on both sides of the construction penetrated with acoustical sealant.

END OF SECTION

SECTION 23 38 13 - COMMERCIAL-KITCHEN HOODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Commercial-kitchen hoods, Type I.

B. Related Requirements:

1. Section 23 00 00 "HVAC" for fire-rated ducts connecting to kitchen hoods.

1.2 DEFINITIONS

- A. Listed Hood:** A hood, factory fabricated and tested for compliance with UL 710 by a testing agency acceptable to authorities having jurisdiction.
- B. Standard Hood:** A hood, usually field fabricated, that complies with design, construction, and performance criteria of applicable national and local codes.
- C. Type I Hood:** A hood designed for grease exhaust applications.
- D. Type II Hood:**

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Required Attendance:

- a. Architect, General Contractor, Food Service Equipment Contractor, HVAC Contractor.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Standard hoods.
2. Filters/baffles.
3. Fire-suppression systems.
4. Luminaires.

B. Shop Drawings: Signed and sealed by a qualified professional engineer.

1. Shop Drawing Scale: 1/4 inch = 1 foot.
2. Show plan view, elevation view, sections, roughing-in dimensions, service requirements, duct connection sizes, and attachments to other work.
3. Show cooking equipment plan and elevation to confirm minimum code-required overhang.
4. Indicate performance, exhaust and makeup air airflow, and pressure loss at actual Project-site elevation.
5. Show control cabinets.
6. Show fire-protection cylinders, piping, actuation devices, and manual control devices.
7. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
8. Design Calculations: Calculate requirements for selecting seismic restraints.
9. Include diagrams for power, signal, and control wiring.
10. Duct Connections: Detail connections between ducts and hoods, including access doors and panels.
11. Piping Diagrams: Detail fire-suppression piping and components and differentiate between manufacturer-installed and field-installed piping. Include roughing-in requirements for drain connections. Show cooking equipment plan and elevation to illustrate fire-suppression nozzle locations.
 - a. Piping Diagram Scale: 1/4 inch = 1 foot.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Coordination Drawing Scale: 1/4 inch = 1 foot.
2. Suspended ceiling assembly components.
3. Structural members to which equipment will be attached.
4. Roof framing and support members for duct penetrations.
5. Items penetrating finished ceiling including the following:
 - a. Luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Moldings on hoods and accessory equipment.

- B. Welding certificates.

- C. Seismic Qualification Data: Submit certification that commercial-kitchen hoods, accessories, and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

- a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Field quality-control reports.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Grease Filters/Baffles: One complete set(s).

1.7 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D 1.1M, "Structural Welding Code - Steel," for hangers and supports; and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 HOOD - ONE (1) VENTILATOR WITH LIGHTS & FIRE SUPPRESSION SYSTEM

- A. Ventilator to be of size, make and model as specified below and as portrayed on the drawings.
- B. Canopy ventilator to measure 6'-0" long x ____ deep with a 3" back standoff x ____" high. Ventilator to be standard equipped with one (1) recessed LED light fixture with warm output. Light fixture to be factory pre-wired to a single connection point. This Manufacturer must confirm with Building Code/Health Department candle-power requirements.

- C. The hood shall be furnished with U.L. classified high efficiency filters, supplied in size and quantity as required by ventilator. Filters to be 85% efficient at 9 microns and 76% efficient at 5 microns.
- D. The grease collection trough at the bottom of the cartridge housing to be pitched to a removable stainless steel grease collection container.
- E. Ventilator shall be equipped with necessary hanger brackets at front and rear, for suspending from ceiling slab or structure above.
- F. Construction shall be type-430 stainless steel with a #3 or #4 polish where exposed. Individual component construction shall be determined by the manufacturer and ETL. Construction shall be dependent on the structural application to minimize distortion and other defects. All seams, joints and penetrations of the hood enclosure to the lower outermost perimeter that directs and captures grease-laden vapor and exhaust gases shall have a liquid-tight continuous external weld in accordance with NFPA 96. Hood shall be wall type with a minimum of four connections for hanger rods. Corner hanging angles have a 5/8" x 1-1/2" slot pre-punched at the factory, allowing hanging rods to be used for quick and safe installation.
- G. A double wall insulated front to eliminate condensation and increase rigidity. The insulation shall have a flexural modulus of 475 EI, meet UL 181 requirements and be in accordance with NFPA 90A and 90B. An integral front baffle to direct grease laden vapors toward the exhaust filter bank. A built-in wiring chase provided for outlets and electrical controls on the hood face and shall not penetrate the capture area or require an external chase-way.
- H. There shall be no removable screws and/or door panels in order to gain access to the ventilator interior, for inspection, cleaning service, or any other purpose.
- I. Ventilator shall be ETL Listed as "Exhaust Hood Without Exhaust Damper", ETL Sanitation Listed and built in accordance with NFPA 96. The hood shall be listed for 450°F cooking surfaces at 150 CFM/ft, 600°F cooking surfaces at 200 CFM/ft, and 700°F cooking surfaces at 250 CFM/ft. Ventilators shall be in compliance with all current recommendations of the National Fire Protection Association's standards for kitchen cooking equipment ventilators; approved by the National Sanitation Foundation; approved by Building Officials and Code Administrators/International, Inc.; and in accordance with all local codes
- J. Ventilator to operate as designed, utilizing exhaust air volumes as shown on plans. Static pressure-drop, the hood exhaust collar sizing and CFM volumes shall match drawings' collar chart data. Unit to be equipped with temperature sensors.
- K. Exhaust duct collar to be 4" high with 1" flange. Duct sizes, CFM and static pressure requirements shall be as shown on drawings. Static pressure requirements shall be precise and accurate; air velocity and volume information shall be accurate within 1-ft increments along the length of the ventilator.
- L. Unit to be fully welded; grease and water tight. No material other than that described above shall be deemed acceptable. Ventilators shall be mounted at 6'-8" above finished floor (A.D.A).

- M. Ventilator to be furnished wet chemical type fire protection system, TANK-SP-2 tank 4 gallon fire system in utility cabinet as manufactured and installed by "Captive Aire" or equal "Ansul", "Pyrochem" or "RangeGuard", including means for automatic and manual activation, along with means for simultaneous automatic shutting down of protected cooking equipment upon activation of said system. All exposed piping to be stainless steel or chrome-plated. Fusible link detection system to be built into ventilators by ventilator manufacturer.

Fire suppression system shall be housed in an enclosure cabinet on right side of hood. Enclosure to be NEMA 1 rated and listed for installation inside of the exhaust hood utility cabinet. Control enclosure is constructed of painted steel. The cabinet shall be water tight to protect against direct hose spray.

- N. Ventilator to be listed by Underwriter's Laboratories, Inc., "Grease Extractors for Exhaust Ducts", U.L. 710; tested by the National Bureau of Standards, Washington DC; in compliance with all recommendations of the National Fire Protection Association's standards for kitchen cooking equipment ventilators; approved by the National Sanitation Foundation; listed by the International Conference of Building Officials; approved by Building Officials and Code Administrators/ International, Inc.; and in accordance with all local codes having jurisdiction.

NOTE: KITCHEN EQUIPMENT CONTRACTOR

**VERIFICATION WITH LOCAL FIRE AUTHORITIES HAVING
JURISDICTION**

1. It is the total responsibility of the Kitchen Equipment Contractor and the Fire Suppression Supplier/Installer to coordinate the following with local fire authorities having jurisdiction:
 - a. Coordinate requirements and location(s) for remote pull station(s).
 - b. The use of dampers at all duct collars.
 - c. In addition to surface protection, the need for suppression nozzles in the plenum area and at duct collars for duct protection.
 - d. Verification and approval by authorities in writing must accompany all submissions for this unit.
 - e. Coordinate all of the above with the Architect, Consulting Engineers and Food Service Consultant.
- O. Gas valve (mechanical or electric) serving cooking equipment furnished and installed by Plumbing Contractor. Shunt trip breaker and/or contactors furnished and installed by Electrical Contractor.
- P. Copies of approvals and testing laboratory data, if required, to be furnished by ventilator manufacturer.
- Q. All ductwork is to be provided and installed by others. All ductwork must be built and installed in accordance with the National Fire Protection Association's Standard Number 96 (NFPA 96) 2014 Edition, Chapter 4 titled Duct Systems.

- R. As part of the installation of the ventilator, a Factory Engineer shall be on site, to coordinate all efforts. A Sales Representative will not be acceptable.
- S. Trim strips and/or panels (as required by ceiling height) of matching material shall be furnished where ventilator abuts to walls and at ceiling. Kitchen Equipment Contractor to verify requirements and show same on Shop Drawing Submittals.
- T. Ventilator to be Model No. ECON AIR DIV HOOD #1/#6738718 as manufactured by "Captive Aire" or approved equal as manufactured by or "Caddy" or "Gaylord" and in accordance with all details set forth herein including all modifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Coordinate equipment layout and installation with adjacent Work, including luminaires, HVAC equipment, plumbing, and fire-suppression system components.
- B. Complete field assembly of hoods where required.
 - 1. Make closed butt and contact joints that do not require filler.
 - 2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "General Hood Fabrication Requirements" Article.
- C. Install hoods and associated services with clearances and access for maintaining, cleaning, and servicing hoods, filters/baffles, grease extractor, and fire-suppression systems according to manufacturer's written instructions and requirements of authorities having jurisdiction.
- D. Make cutouts in hoods where required to run service lines and to make final connections, and seal openings according to UL 1978.
- E. Securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners unless otherwise indicated.
- F. Install hoods to operate free from vibration.
- G. Install seismic restraints according to SMACNA's "Kitchen Ventilation Systems & Food

Service Equipment Guidelines," Appendix A, "Seismic Restraint Details."

- H. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at **48 inches** o.c. maximum.
- I. Install sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.
- J. Install lamps, with maximum recommended wattage, in equipment with integral lighting.
- K. Set initial temperatures, and calibrate sensors.
- L. Set field-adjustable switches.

3.3 CONNECTIONS

- A. Where installing piping adjacent to hoods, allow space for service and maintenance.
- B. Install reduced-pressure backflow preventer on washer-water supply. Backflow preventer is specified in Section 221119 "Domestic Water Piping Specialties."
- C. Install washer-water drain piping full size of hood connection to an adjacent floor drain or a floor sink.
- D. Makeup Water Connection: Comply with applicable requirements for valves and accessories on piping connections to water-cooled units in Section 221119 "Domestic Water Piping Specialties."
- E. Connect ducts according to requirements in Section 233300 "Air Duct Accessories." Install flexible connectors on makeup air supply duct. Weld exhaust-duct connections with continuous liquidtight joint.
- F. Install fire-suppression piping for remote-mounted suppression systems according to NFPA 17A, "Wet Chemical Extinguishing Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Test each equipment item for proper operation. Repair or replace equipment that is defective, including units that operate below required capacity or that operate with excessive noise or vibration.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and

- equipment.
- 3. Test water, drain, gas, and liquid-carrying components for leaks. Repair or replace leaking components.
- 4. Perform hood performance tests required by authorities having jurisdiction.
- 5. Perform fire-suppression system performance tests required by authorities having jurisdiction.
- D. Commercial-kitchen hoods will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial-kitchen hoods.

END OF SECTION 23 38 13

SECTION 26 00 00 - ELECTRICAL

PART 1 -GENERAL	1
1.1 GENERAL PROVISIONS	1
1.2 WORK INCLUDED	1
1.3 RELATED WORK	2
1.4 DEFINITIONS.....	2
1.5 INSPECTION OF SITE.....	2
1.6 CONTRACTOR'S REPRESENTATIVE	2
1.7 COOPERATION	3
1.8 CODES, ORDINANCES, AND PERMITS	3
1.9 ELECTRICAL ROOMS OR SPACES.....	3
1.10 SUBMITTALS	4
1.11 GUARANTEE	4
1.12 ELECTRICAL CHARACTERISTICS.....	4
1.13 TEMPORARY LIGHT & POWER.....	4
1.14 RECORD DRAWINGS.....	5
1.15 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS	6
1.16 INSPECTIONS AND TESTS.....	6
1.17 RETURN AIR PLENUM	6
1.18 PHASING, DEMOLITION AND MAINTAINING EXISTING SERVICES	7
PART 2 -PRODUCTS	8
2.1 GENERAL.....	8
2.2 RACEWAYS AND FITTINGS.....	8
2.3 CONDUCTORS	11
2.4 ACCESS PANELS	12
2.5 SLEEVES, INSERTS, AND OPENINGS.....	13
2.6 WIRING DEVICES.....	13
2.7 LIGHTING FIXTURES	14
2.8 ELECTRICAL POWER EQUIPMENT	17
2.9 ELECTRICAL SYSTEM CONTROLS AND INSTRUMENTS.....	18
2.10 GROUNDING SYSTEM.....	18
2.11 SEALS	19
PART 3 -EXECUTION	20
3.1 WORK COORDINATION AND JOB OPERATIONS	20
3.2 PLANS AND SPECIFICATIONS	21
3.3 IDENTIFICATION.....	21
3.4 PROTECTION AND CLEANUP.....	22
3.5 PORTABLE OR DETACHABLE PARTS	22
3.6 SAFETY PRECAUTIONS.....	22
3.7 MOUNTING HEIGHTS.....	22
3.8 WORKMANSHIP AND INSTALLATION METHODS	23
3.9 BRANCH CIRCUITS.....	28
3.10 FIREPROOFING AND WATERPROOFING	28

3.11 CUTTING AND PATCHING 28
3.12 MECHANICAL SYSTEM COORDINATION..... 28
3.13 STORAGE AND INSTALLATION OF EQUIPMENT 29

END OF INDEX

SECTION 26 00 00 - ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The conditions of the contract and all sections of Division 1 of these specifications are hereby made a part of this section unless otherwise excluded.

1.2 WORK INCLUDED

- A. Work described herein shall be interpreted as work to be done by this contractor. Work to be performed by other trades will be referenced to a particular division of these specifications.
 - 1. This list does not relieve the subcontractor from the responsibility of reviewing each and every drawing of these contract documents to determine if there are further requirements to the sections of work and to determine how work interfaces with other trades and sections of these contract documents.
 - 2. Work described herein shall be interpreted as work to be done by the Electrical Subcontractor. Work to be performed by other trades will be referenced to a particular contractor or subcontractor.
- B. Provide all labor, materials, tools, and equipment, to complete the installation of the electrical system. Install, equip, adjust, and put into operation the respective portions of the installation specified, and so interconnect various items or sections of work in order to form a complete and operating whole. The work shall consist of, but shall not necessarily be limited to, the following:
 - 1. Emergency lighting indicated by half shaded fixtures shall contain integral battery back-up.
 - 2. Lighting systems, including lamps, fixtures, controls, etc.
 - 3. All raceway systems, including boxes, couplings, and fittings.
 - 4. All branch circuit wiring systems, including wiring devices, plates, etc.
 - 5. Connections for all building equipment, including mechanical, plumbing, and the like.
 - 6. All testing of equipment installed.
 - 7. Any other item of work hereinafter specified or indicated on electrical drawings.
 - 8. Drilling, coring, and cutting of holes (where the largest dimension thereof does not exceed 12 inches) for electrical conduit system, cables and equipment Refer to 01 73 29.
 - 9. Systems Identification.
 - 10. Scaffolding, Rigging, and Staging for all Electrical Work, not provided under 01 50 00.
 - 11. Fire stopping shall be performed by this contractor. Refer to 07 84 13.

1.3 RELATED WORK

- A. The following related work is performed under designated sections.
1. Temporary Controls – DIVISION 1 – GENERAL REQUIREMENTS.
 2. Payment for energy for temporary light and power shall be made by Owner.
 3. Cutting beyond 01 73 29, 1.2,B.8 and above and patching of all openings regardless of size will be by the section responsible for the surface on which the penetration occurs.
 4. Automatic Temperature Control: SECTION 23 00 00 - HEATING, VENTILATING, AND AIR CONDITIONING.
 5. Firestopping 07 84 13.

1.4 DEFINITIONS

- A. Most terms used within the documents are industry standard. Certain words or phrases shall be understood to have specific meanings as follows:
1. Provide: Furnish and install completely connected up and in operable condition.
 2. Furnish: Purchase and deliver to a specific location within the building or site.
 3. Install: With respect to equipment furnished by others, install means to receive, unpack, move into position, mount and connect, including removal of packaging materials.
 4. Conduit: Raceways of the metallic type which are not flexible. Specific types as specified.
 5. Connect: To wire up, including all branch circuitry, control and disconnection devices so item is complete and ready for operation.
 6. Subject to Mechanical Damage: Equipment and raceways installed exposed and less than eight feet above finished floor in mechanical rooms or other areas where heavy equipment may be in use or moved.

1.5 INSPECTION OF SITE

- A. Electrical bidders shall inspect site. Failure to inspect existing conditions or to fully understand work which is required shall not excuse this contractor from his obligations to supply and install work in accordance with specifications and the drawings and under all site conditions as they exist.

1.6 CONTRACTOR'S REPRESENTATIVE

- A. Retain a competent representative on the project.

1.7 COOPERATION

- A. Work shall be carried on under usual construction conditions, in conjunction with other contractors work. Cooperate with other contractors, coordinate work and proceed in a manner as not to delay progress.
- B. Before proceeding, examine all construction drawings and consult other contractors to coordinate installation and avoid interference.

1.8 CODES, ORDINANCES, AND PERMITS

A. Codes and Ordinances:

- 1. All material and work provided shall be in accordance with the following codes and standards as most recently amended.

Commonwealth of Massachusetts Code, 8th Edition

Massachusetts Electric Code, 2023 Edition

State Department of Public Safety

NFPA 101 "Life Safety Code"

NFPA Standards

Standards of the Underwriters Laboratories (UL)

Occupational Safety and Health Act (OSHA)

Americans with Disabilities Act (ADA)

Energy Conservation Code

Town of Southbridge

- 2. Where contract documents indicate more stringent requirements than codes, the contract documents shall take precedence.

B. Permits:

- 1. Be responsible for filing documents, payment of fees, and securing of inspection and approvals. Refer to Instructions To Bidders.

1.9 ELECTRICAL ROOMS OR SPACES

- A. Be responsible for ensuring that the dedicated space and clearances required in the NEC, Sections 110-16 and 110-26 are maintained for all electrical equipment.
- B. Call other contractors' attention to the requirements contained in the above mentioned code sections, prior to the installation of equipment by other contractors, in order to ensure no violations.

1.10 SUBMITTALS

- A. Refer to Section 01 33 00 Submittal Procedures for information relative to submission of shop drawings. Six copies are required. No equipment for which review is required shall be installed prior to review, except at Contractor's own risk. Shop Drawings will be required for all electrical equipment.
- B. Notwithstanding any restrictions upon contractor proposed substitutions, should apparatus or materials be permitted by Architect to be substituted for those specified for good cause, and such substitution necessitates changes in or additional connections, piping, supports, or construction, same shall be provided. Assume cost and entire responsibility thereof. Any proposed substitutions shall include the substitution request form as outlined in Section 01.33.00.
- C. Submit the following samples:
 - 1. Lighting fixtures as may be requested.
 - 2. Other items as may be requested.

1.11 GUARANTEE

- A. Keep work in repair without expense to Owner as far as concerns defects in workmanship or materials for a period of not less than one year from date of substantial completion.

1.12 ELECTRICAL CHARACTERISTICS

- A. In general, and unless specifically indicated otherwise, all building service, heating, ventilating, air conditioning, and plumbing equipment shall be of the following characteristics.
 - 1. Motors up to and including 1/3 HP shall be suitable for 120 volts, one phase operation.
 - 2. Motors larger than 1/3 HP shall be suitable for 208 or 480 volts, three phase operation.
 - 3. Electric heating equipment 1.5 KW and less shall be suitable for 120 volt single phase operation. Over 1.5 KW shall be 208 volt three phase.
- B. Power Factor: All equipment provided rated greater than 1,000 watts and lighting equipment greater than 15 watts with an inductive reactance load component shall have a power factor of not less than 90 percent under rated load conditions.

1.13 TEMPORARY LIGHT & POWER

- A. Refer to and comply with Section 01 50 00 Temporary Facilities and Controls and the following:
- B. Provide capacity from Owner's system for temporary service and pay all expenses related thereto. Provide any equipment as may be required, including transformer.
- C. Temporary light and power shall be provided constantly from 1/2 hour before normal until 1/2 hour after normal working hours.

- D. Temporary light shall be based on one 200 watt lamp covering each 1,000 square feet of floor area. Each room 100 square feet and over shall have a minimum of one 100 watt lamp. Motors up to 3/4 HP only shall be provided for. No provisions are to be made for electric welders or hoisting equipment.
- E. Provide outlets located at convenient points so extension cords of not over 50 ft. will reach all work.
- F. Subcontractors of other trades shall furnish their own extension cords and shall also pay cost of all temporary wiring of their construction offices and shanties.
- G. Any temporary wiring of a special nature other than mentioned above shall be paid for by subcontractor using same.
- H. Cost of energy consumed by all trades will be paid by General Contractor. Provide check meter as required.
- I. Permanently installed lighting fixtures may be used for temporary lighting with the provision that any burned out lamps be replaced at time when Owner takes beneficial occupancy.
- J. Any portion of the permanent electrical system, used for temporary shall be restored to "as new" condition.
- K. Temporary Wiring System:
 - 1. Every precaution shall be taken to make any necessary temporary open wiring inaccessible to unqualified personnel. Rooms containing electrical equipment with energized exposed parts shall be locked.
 - 2. All temporary work shall be furnished and installed in conformity with National Electric Code and in accordance with requirements of OSHA and local ordinances.
 - 3. All temporary wiring shall be maintained throughout construction period and shall be removed when no longer needed.

1.14 RECORD DRAWINGS

- A. Refer to Section 01 78 39 – Project Record Documents for general requirements for maintenance as-built drawings and submitting final reproducible record documents.
- B. Provide two sets of black or blue line on white drawings to maintain and submit record drawings, one set shall be maintained at site and which shall be accurate, clear, and complete showing actual location of all equipment as installed. Record drawings shall be updated at least monthly. Record drawings shall show outlet from which homeruns are taken, and location of all junction boxes and access panels. These drawings shall be available to Architect/Engineer field representative.
- C. Any addenda sketches and supplementary drawings issued during course of construction shall be attached to drawings.
- D. At completion, submit an accurate checked set of drawings.

- E. After approval of these drawings, photo reproductions of original tracings shall be revised to incorporate changes, including addenda sketches and supplementary drawings. Fitup drawings for tenant areas shall also be revised in the same manner. These "as-built" photo reproductions shall be certified as correct and delivered to the Architect along with two sets of black line prints, and PDF files on a CD.

1.15 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. General: Refer to Section 01 78 23 – Operation and Maintenance Data for general requirements for submittal of operations and maintenance manuals, training of personnel and related closeout procedures.
- B. Operating Instructions: Furnish operating instructions to Owner's designated representative with respect to operations, functions and maintenance procedures for equipment and systems installed. Cost of such instruction up to a full three days of Electrical Subcontractor's time shall be included in contract. Cost of providing a manufacturer's representative at site for instructional purposes shall also be included as outlined in each system herein.
- C. Maintenance Manuals:
 - 1. Provide four copies of complete manuals containing the following:
 - a. Complete shop drawings of equipment.
 - b. Operation description of systems.
 - c. Names, addresses, and telephone numbers of suppliers of systems.
 - d. Vendors' P.O. numbers for equipment installed.
 - e. Preventive maintenance instructions for systems.
 - f. Spare parts list of system components.
 - 2. All information shall be in binders.

1.16 INSPECTIONS AND TESTS

- A. Inspection: If inspection of materials installed shows defects, such defective work, materials, and/or equipment shall be replaced and inspection and tests repeated.
- B. Tests: Make reasonable tests and prove integrity of work and leave electrical installation in correct adjustment and ready to operate. All panels shall have phases balanced as near as practical. A consistent phase orientation shall be adhered to at all terminations.

1.17 RETURN AIR PLENUM

- A. All wiring systems above hung ceiling areas shall be run in conduit or shall be "UL Listed" plenum cable.

1.18 PHASING, DEMOLITION AND MAINTAINING EXISTING SERVICES

- A. During the execution of the work, required relocation, rerouting, etc., of existing equipment and systems in the existing building areas where new work is to be installed or new connections are scheduled to be made, shall be performed by the Electrical Subcontractor, as required by job conditions and as determined by the Architect in the field, to facilitate the installation of the new system, while demolition, relocation work or new tie-ins will be performed. Outages required for construction purposes shall be scheduled for the shortest practical periods of time, in coordination with the Owner's designated representative, for specified, mutually agreeable periods of time, after each of which the interruption shall cease and the service shall be restored. This procedure shall be repeated to suit the Owner's working schedule, as many times as required until all work is completed. Any outages of service shall be approved by the Owner, prior to commencing the work. No outages or shutdowns of service shall occur without the written authorization of the Owner prior to commencing the work. Give notice of any scheduled shutdowns, a minimum of two weeks in advance. Owner shall make their best efforts to meet this request without adversely affecting the electric service to the existing building.
- B. Prior to any deactivation and relocation or demolition work, consult the drawings and arrange a conference with the Architect and the Owner's representative in the field to inspect each of the items to be deactivated, removed or relocated. Care shall be taken to protect all equipment designated to be relocated and reused or to remain in operation and be integrated with the new systems.
- C. Where existing outlets are to be reused and are cut off by the remodeling, they shall be reconnected to existing circuits as required by field conditions. Where existing outlets are to be abandoned, they shall be removed and blank plates installed. Each bidder shall, before submitting his bid, visit the site and make a thorough examination of the conditions in the existing buildings in order to determine the extent of the work to be done.
- D. All deactivation, relocation and temporary tie-ins of electrical systems and equipment shall be provided by the Electrical Subcontractor. All demolition and removal of electrical systems and equipment designated to be demolished shall be provided by the Electrical Subcontractor. Stack all demolished electrical materials except hazardous materials (PCB lighting ballasts, fluorescent lamps, etc.) nearby for removal by the General Contractor. All hazardous electrical materials shall be legally disposed by the General Contractor. General Contractor will be responsible for removal of the PCB ballasts and lamps from the light fixtures.
- E. The Owner reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.
- F. Phasing:
 - 1. The Electrical Subcontractor shall construct the subject in phases as directed by the Architect to suit the project progress schedule, as well as the completion date of the project.
 - 2. For additional information related to phasing, review the General Conditions and Supplementary Conditions and the Architectural drawings.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Product specifications are written in such a manner so as to specify what materials may be used in a particular location or application and therefore do not indicate what is not acceptable or suitable for a particular location or application. As an example: non-metallic sheathed cable is not specified; therefore, it is not acceptable.
- B. For purpose of establishing a standard of quality and not for purpose of limiting competition, the basis of this Specification is upon specified models and types of equipment and materials, as manufactured by specified manufacturers.
- C. In all cases, standard cataloged materials and systems have been selected. Materials such as lighting fixtures specially manufactured for this particular project and not part of a manufacturers' standard product line will not be acceptable. In the case of systems, the system components shall be from a single source regularly engaged in supplying such systems. A proposed system made up of a collection of various manufacturers' products will be unacceptable.
- D. Where Specifications list manufacturers' names and/or "as approved" or "Equal approved by Contracting Officer", other manufacturers' equipment will be considered if equipment meets Specification requirements and has all features of the specified items as are considered essential by Architect.
- E. All material shall be new and shall be UL listed.

2.2 RACEWAYS AND FITTINGS

- A. Raceways - General:
 - 1. No raceway shall be used smaller than $\frac{3}{4}$ in. diameter and shall have no more than four 90 deg. bends in any one run, and where necessary, pull boxes shall be provided. Only rigid metal conduit or intermediate metal conduit is allowed for slab work and only where allowed by Architect.
 - 2. Rigid metal conduit conforming to, and installed in accordance with, Article 344 shall be heavy wall zinc coated steel conforming to American Standard Specification C80-1 and may be used for service work, exterior work, slab work, and below grade level slab, wet locations, where raceway may be subject to mechanical damage.
 - 3. Intermediate metal conduit conforming to, and installed in accordance with, Article 342, may be used for all applications where rigid metal conduit is allowed by these specifications.
 - 4. Electrical Metallic Tubing (EMT), conforming to, and installed in accordance with, Article 358 shall be zinc coated steel, conforming to industry standards, may be used in masonry block walls, stud partitions, above furred ceilings, where exposed but not subject to mechanical damage.
 - 5. Surface metal raceways conforming to and installed in accordance with Article 386 shall be used where shown on drawings.

6. Flexible metal conduit shall be used for final connections to recessed lighting fixtures from above ceiling junction boxes and for final flexible connections to motors and other rotating or vibrating equipment. Liquid tight flexible metal conduit shall be used for the above connections which are located in moist locations. All flexible connections shall include an insulated grounding conductor.
7. Rigid non-metallic conduit may be used at the Contractor's option for underground electric and low tension services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40, 90 deg. C.
 - a. PVC shall be UL 651A listed and meet NEMA TC2.
8. PVC schedule 40 may also be used for below slab work within building confines and below grade branch circuits outside the building foundation. Raceway and fittings shall be of the same manufacturer. Below slab conduits do not require concrete encasement. Rigid non metallic conduit shall not be used in-slabs.
9. Acceptable manufacturers:
 - a. Pittsburgh Standard Conduit Company
 - b. Republic Steel and Tube
 - c. Youngstown Sheet and Tube Company
 - d. Carlon
 - e. Or equal
10. Fittings:
 - a. Provide insulated bushings on all raceways 1 inch diameter or larger.
 - b. Manufacturer's standard fittings shall be used for raceway supports.
 - c. Expansion Fittings: Expansion fittings shall be used where structural and concrete expansion joints occur and shall include a ground strap.
 - d. Couplings for rigid metal and intermediate metal conduit shall be threaded type.
 - e. Threadless fittings for EMT shall be set screw type. All fittings shall be concrete tight. No diecast fittings allowed except for raceways larger than 1 inch diameter.
 - f. All entrance seals shall be equal to O.Z. Gedney type "WSK".
 - g. Couplings, elbows and other fittings used with rigid nonmetallic conduit shall be of the solvent cemented type to secure a waterproof installation.
 - h. Acceptable manufacturers:
 - 1) O.Z.
 - 2) Crouse Hinds
 - 3) Appleton
 - 4) EFCOR
 - 5) Steel City
 - 6) Or equal

B. Outlets, Pull and Junction Boxes:

1. Outlets:

- a. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations or surface mounted shall be of the cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps not allowed in new construction. Thru the wall boxes are not permitted.
- b. Each box shall have sufficient volume to accommodate number of conductors in accordance with requirements of Code. Boxes shall not be less than 1-1/2 in. deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and bracket outlet boxes shall not be less than 4 in. octagonal except that smaller boxes may be used where required by particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4 in. square or of comparable volume.
- c. Far side box supports shall be Caddy J-1A.
- d. Acceptable manufacturers:
 - 1) Appleton
 - 2) Crouse Hinds
 - 3) Steel City
 - 4) RACO
 - 5) Or equal

2. Pull and Junction Boxes: Where indicated on plans, and where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish, and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code.

Boxes in moist or wet areas shall be galvanized type. Boxes larger than 4-11/16 inches square shall have hinged covers. Boxes larger than 12 inches in one dimension will be allowed to have screw fastened covers, if a hinged cover would not be capable of being opened a full 90 degrees due to installation location.

- a. Acceptable Manufacturers:
 - 1) Brasch
 - 2) Hoffman
 - 3) Keystone
 - 4) Lee Products Co.
 - 5) McKinstry Inc.
 - 6) Eldon Inc.
 - 7) Or equal

2.3 CONDUCTORS

- A. All conductors shall be a minimum size of #12 AWG except for control wiring and fire alarm wiring where #14 AWG may be used. For all exit sign circuits, normal/emergency circuits, exterior lighting circuits, and also where distance from panelboard to first outlet exceeds 100 ft. @ 120 volts, #10 AWG shall be minimum size wire allowed. All feeder and branch circuit conductors shall be color coded as follows:
- | | | | |
|----|--------------------|---------|-------------------------|
| 1. | 208Y/120V | Phase A | Black |
| 2. | 208Y/120V | Phase B | Red |
| 3. | 208Y/120V | Phase C | Blue |
| 4. | Grounded Conductor | 120/208 | White |
| 5. | Equipment Ground | 120/208 | Green |
| 6. | Isolated Ground | 120/208 | Green with Orange Trace |
- B. All conductors not installed in accordance with color scheme shall be replaced. All conductors larger than #6 AWG must be identified with colored tape.
- C. Connections throughout the entire job shall be made with solderless type devices.
1. For #10 AWG and smaller: spring type.
 2. For #8 AWG and larger: circumferential compression type.
 3. Acceptable manufacturers:
 - a. 3M "Scotchlock"
 - b. IDEAL "Wingnut"
 - c. BURNDY
 - d. MAC
 - e. Or equal
 4. Any splices made up in ground mounted pull boxes shall be resin cast waterproof type or waterproof pressure type.
- D. Conductors shall be copper, soft drawn, and annealed of 98 percent conductivity. Conductors larger than #10 AWG shall be stranded; #10 AWG and smaller shall be solid. Conductors shall be insulated for 600 volts and be of following types:
1. All conductors shall have heat/moisture resistant thermoplastic insulation type THHN/THWN (75°C) except as follows:
 - a. In sizes #1 AWG and larger: Crosslinked polyethylene insulation type XHHW (75 deg. C – 90 deg. C) may be used.
 - b. Fire alarm system conductors shall be #14 AWG, type THHN, solid. Color coding of fire alarm conductors shall be in accordance with fire codes.
 - c. Fixture whips #16AWG type "SF".
- E. Stranded conductors for all wiring systems except fire alarm will be allowed if installed and terminated as specified under Execution Section.

- F. Type MC cable may be used for concealed branch circuits in hollow spaces where allowed by code if installed and terminated as specified under Execution Section. Armor to be galvanized steel and shall be UL Listed for 2-hour fire wall penetration. Lightweight steel armor is acceptable. Aluminum armor is not acceptable.
- G. Acceptable manufacturers:
 - 1. AFC Cable Systems
 - 2. Cerro
 - 3. Cornish
 - 4. Cresent
 - 5. General Cable
 - 6. Okonite
 - 7. Or equal

2.4 ACCESS PANELS

- A. Furnish access panels for installation by General Contractor for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.
- B. Access panels shall be located in a workmanlike manner in closets, storage rooms, and/or other non-public areas, positioned so that junction can be easily reached and size shall be sufficient for purpose (minimum size 12" x 12"). When access panels are required in corridors, lobbies, or other habitable areas, they shall be located as directed.
- C. Access panels shall be prime painted and equipped with screwdriver operated cam locks.
- D. Acceptable manufacturers:
 - 1. Inland Steel Products Company - Milcor
 - 2. Miami Carey
 - 3. Walsh-Hannon-Gladwin, Inc. - Way Locator
 - 4. Or equal
 - 5. Specific types:
 - a. Acoustical Tile Ceiling "Milcor Type AT"
 - b. Plastered Surfaces "Milcor Type K"
 - c. Masonry Construction "Milcor Type M"
 - d. Drywall Construction "Milcor Type DW"
- E. Furnish access panel shop drawings.

2.5 SLEEVES, INSERTS, AND OPENINGS

- A. Sleeves: Provide sleeves of proper sizes for all openings required in concrete floors and walls. Sleeves passing through floors shall be set with top of sleeve 1 in. above finished floor. Core drilling will also be acceptable if in accordance with any structural standards. Any unsleeved openings shall be waterproofed.
- B. Inserts: Provide inserts or other anchoring devices in concrete and masonry construction as required to support raceways and equipment.
- C. Openings: Where an opening is required in concrete slabs to allow passage of a multitude of raceways, give adequate notice to General Contractor so he may box out opening in form work.
- D. Sleeves or openings through slabs for passage of future cables shall be located within 6 inches of walls and shall be in a single row and shall be proofed whether used or not.
- E. Any openings through fire rated surfaces shall be closed off with fireproofing materials providing the same rating as the surface penetrated.
 - 1. Acceptable Manufacturers:
 - a. Specified Technologies Inc.
 - b. Thomas & Betts
 - c. International Protective Coatings Corp.
 - d. 3M Fire Protection Products
 - e. Dow Corning
 - f. Or equal

2.6 WIRING DEVICES

- A. Receptacles: Receptacles shall be flush mounted. All standard 20 ampere devices to be of same manufacturer.
 - 1. Acceptable Manufacturers:
 - a. Twenty (20) ampere duplex grounding type NEMA 5-20R,
 - 1) Cooper 5362-V,
 - 2) Hubbell 5362I,
 - 3) Pass and Seymour 53621,
 - 4) Leviton 5362-I
 - 5) Or equal
- B. Switches: 20 ampere,
 - 1. Cooper CWD 2221,
 - 2. Hubbell 1221,
 - 3. Pass and Seymour 20AC-2,

4. Leviton 1221.
5. Or equal
6. Prewired devices with pigtails acceptable
- C. Composition material of wiring devices to be nylon with black finish. Confirm with Architect and match existing devices.
- D. Coverplates brushed US 302 stainless steel:
 1. Provide gaskets on all wiring device plates where devices are on walls separating conditioned and non-conditioned spaces including exterior walls.

2.7 LIGHTING FIXTURES

A. General

1. Submit the following in accordance with project submittal procedures:
 - a. Catalog Data: Submit catalog data describing luminaires, lamps, and ballasts. Include data substantiating that materials comply with specified requirements. Arrange data for luminaires in the order of fixture designation.
 - b. Performance Curves/Data:
 - 1) Submit certified photometric data for each type of luminaire.
 - 2) Submit supply-air, return-air, heat-removal, and sound performance data for air handling luminaires.
 - c. Drawings: Submit shop drawings for non-standard luminaires.
 - d. Calculations: Submit as requested to support equal product proposals.
 - e. Warranty: Submit warranties for luminaires and for electronic ballasts.
2. All lamps, ballasts, led sources, drivers, and controls shall meet the latest utility company incentive requirements. Refer to the latest program requirements documentation and coordinate with the utility company to ensure compliance.

B. Quality Assurance

1. Comply with the National Electrical Code (NEC) and the State Building Code (MBC) for components and installation.
2. Provide luminaires listed and labeled by a nationally recognized testing laboratory (NRTL) for the application, installation condition, and the environments in which installed.
3. Use manufacturers that are experienced in manufacturing luminaires, lamps and ballasts similar to those indicated for this Project and have a record of successful in-service performance.
4. Coordinate luminaires, mounting hardware and trim with the ceiling system.

C. LED Assemblies

1. LED luminaires shall conform to UL 1598 and to UL 8250 – Safety Standard for Light-Emitting Diode (LED) Light Sources for Use in Lighting Products.

2. Products shall be lead and mercury free.
3. Photometric characteristics shall be established using IESNA LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products.
4. Color characteristics of LED luminaires shall be as follows in accordance with ANSI C78.377 – Specifications for the Chromaticity of Solid State Lighting Products.
5. LED and driver cooling system shall be passive and shall resist the buildup of debris.
6. LED luminaire output after 50,000 hours of operation shall be not less than 70 percent of the initial lumen output when determined in accordance with IESNA LM-80-08 – IESNA approved Method for Measuring Lumen Maintenance of LED Lighting Sources.
7. LED source package electrical characteristics:
 - a. Supply voltage: 120 V, 208 V, 240 V, 277 V, or 480 V as indicated on the Drawings. Provide step-down transformers if required to match driver input voltage rating.
 - b. Total harmonic distortion (current): Not more than 10 percent
 - c. Power factor: Not less than 90 percent
 - d. RF interference: Meet FCC 47 CFR Part 15/18
 - e. Transient protection: IEEE C62.41 Class A.

D. Interior General:

1. Furnish interior luminaries that comply with requirements specified below, indicated on the Drawings, and as required to meet conditions of installation.
2. Metal parts shall be free from burrs and sharp corners and edges.
3. Metal components shall be formed and supported to prevent sagging and warping.
4. Steel parts shall be finished with manufacturer's standard finish applied over a corrosion-resistant primer. Finish shall be free from runs, streaks, stains, holidays or defects.
5. Doors and frames shall be smooth operating and free from light leakage under operating conditions. Relamping shall be possible without the use of tools. Doors, frames, lenses and diffusers shall be designed to prevent accidental falling during relamping and when secured in the operating position.
6. Luminaires shall have minimum reflecting surface reflectance as follows unless specified otherwise on the Drawings:
 - a. White Surfaces: 85 percent
 - b. Specular Surfaces: 83 percent
 - c. Diffusing Specular Surfaces: 75 percent
7. Lenses, diffusers, covers and globes shall be 100 percent virgin acrylic unless specified otherwise on the Drawings. Lenses shall have 0.125 inches minimum thickness. Lenses for fluorescent troffers shall be injection molded.

8. Luminaires shall conform to UL 1598 - Luminaires. Provide product with damp location listing or wet location listing as required by installation location.

E. Interior Accessories

1. Provide stud supports, mounting brackets, frames, plaster rings and other accessories required for luminaire installation.
2. Furnish hangers as specified below and as required by conditions of installation:
 - a. Stem hangers shall be made of 1/2-inch steel tubing with 45 degrees swivel ball hanger fitting and ceiling canopy. Finish the same as the luminaire.
 - b. Rod hangers shall be made of 1/4 inch threaded zinc-plated steel rod.
 - c. For HID luminaires provide hook hangers that are integrated assemblies matched to the luminaire and line voltage; equip with threaded attachment, power cord and locking type plug. Provide a safety chain or cable for each luminaire that will attach to the building structure, the ballast housing, and to the reflector/diffuser assembly.
3. Use NRTL-listed T-bar safety clips for lay-in luminaires.
4. Where indicated on the Drawings or where lamp breakage is detrimental, such as above food counters, provide open fluorescent luminaires with:
 - a. Self-locking sockets or lamp retainers, two per lamp, and clear polycarbonate protective lamp sleeves with end caps over each lamp. Sleeve shall have a light transmission of 95 percent and shall be rated for the thermal profile of the lamp and ballast.

F. Interior Installation

1. Install interior lighting system in accordance with the NEC, manufacturer's installation instructions, approved shop drawings, and NECA National Electrical Installation Standards.
2. Have the manufacturer's installation instructions available at the Project site.
3. Mounting heights specified or indicated on the Drawings are to the bottom of the luminaire for ceiling-mounted fixtures and to the center of the luminaire for wall-mounted fixtures.
4. Where the ceiling forms the protective membrane of a fire resistive assembly, install protective coverings over luminaires in accordance with NRTL requirements.
5. Install slack safety wires as described below for luminaires in or on suspended ceilings.
 - a. Wire shall be minimum 12 gage galvanized soft annealed steel wire conforming to ASTM A641.
 - b. Attach wire to the building structure directly above the attachment point on the box or luminaire; make trapezes of framing channel material as required to span obstacles
 - c. Secure wire(s) at each end with not less than three tight turns in 1-1/2 inches.

6. Support pendant-mounted or cable-supported luminaires directly from the structure above using a 9 gage wire or an approved alternate support without using the ceiling suspension system for direct support.
 - a. Install seismic restraints for pendant-mounted and cable-supported luminaires.
 - b. Pendants, rods, cables, or chains 4 ft or longer shall be braced to prevent swaying using three cables at 120 degrees separation.

G. Interior Quality Control

1. Make electrical connections, clean interiors and exteriors of luminaires, install lamps, energize and test luminaires, inspect interior lighting system, and deliver spare parts in accordance with manufacturer's instructions and NECA National Electrical Installation Standards:
2. Test electronic dimming ballasts for full range dimming capability.
 - a. Burn-in dimmer controlled fluorescent lamps at full output for not less than 100 hours before dimming.
 - b. Check for visually detectable flicker over the full dimming range.

2.8 ELECTRICAL POWER EQUIPMENT

A. Disconnect Switches:

1. Disconnect (safety) switches shall conform to industrial standards of NEMA, be UL listed and shall be heavy duty type, quick-make, quick-break type with interlocking cover mechanism and provisions for padlocking switch handle in "OFF" position. Three pole toggle switches are not acceptable as substitute for disconnect switches.
2. Disconnect switches shall be of fused or unfused type as indicated with number of disconnecting poles indicated. The grounded conductor shall not be switched. Switches for use with current limiting fuses shall be rejection type and those used in conjunction with motors shall be horsepower rated. Provide oversize termination lugs if required by conductor size.
3. Enclosures shall be of proper NEMA type for intended location and shall be phosphate coated or equivalent code gauge galvanized sheet steel with ANSI #24 dark gray baked enamel finish.
4. Acceptable Manufacturers:
 - a. Westinghouse
 - b. Square D/Groupe Schneider
 - c. Siemens
 - d. General Electric
 - e. Or equal

B. Fuses:

1. Provide a complete set of fuses for each item of fusible type equipment. Fusible equipment furnished by other contractors will be complete with fuses, unless noted otherwise on electrical drawings. Each fuse initially installed shall be provided with Bussmann SAMI-indicating fuse covers.
2. Turn over to authorized representative of Owner upon completion a spare set of fuses of each different type and ampere rating installed. These spares shall be bound with twine and tagged.
3. Secondary system fuses, rated at 600 volts or less, shall be UL listed and constructed in conformance with the applicable standards set forth by NEMA and ANSI. All fuses of a particular class shall be of same manufacturer.
4. All fuses in distribution panelboards and switchboards shall be class "L" above 600 amperes and class "RK1" for 600 amperes and below.
5. Main, Feeder, and Branch Circuits:
6. Circuits 601 amperes and above shall be protected by (Bussmann type KRP-C LOW-PEAK) current limiting time delay fuses.
7. Circuits 0-600 amperes shall be protected by (Bussmann "LOW-PEAK" dual element), KPS-RK (600 volts), UL class RK-1.
8. Acceptable Manufacturers:
 - a. Bussmann, Division of McGraw
 - b. Gould/Shawmut
 - c. GEC-ALSTHOM
 - d. Or equal

2.9 ELECTRICAL SYSTEM CONTROLS AND INSTRUMENTS

- A. Provide a complete power system consisting of branch circuits, motor disconnect switches, and other devices to connect up and leave in operating condition each piece of electrically operated equipment provided either under this section or other Divisions.
- B. All control wiring not indicated in the electrical specifications or not shown on electrical drawings will be provided by Temperature Control Subcontractor.

2.10 GROUNDING SYSTEM

- A. The grounded conductor shall be supplemented by an equipment grounding system.
- B. The equipment grounding system shall be installed so all conductive items in close proximity to electrical circuits operate continuously at ground potential and provide a low impedance path for ground fault currents.
- C. Grounding conductors shall be so installed as to permit shortest and most direct path to ground.

- D. Equipment grounding conductors and straps shall be sized in compliance with Code Table 250-122.
- E. Grounding conductors shall be insulated with green color. Grounding conductors for use on isolated ground receptacles shall be green with trace color to differentiate between normal ground conductors.
- F. Branch circuits shall consist of phase and grounded conductor installed in common metallic raceway. The raceway system may not serve as the grounding conductor. All circuits shall have a separate insulated grounding conductor installed. Any flexible cable system or non-metallic raceway system shall have an insulated grounding conductor. Any cable system for use on isolated ground circuits shall have both an isolated ground conductor as well as an equipment ground conductor, both of which shall be insulated.
- G. Each electrical expansion fitting shall be furnished with a bonding jumper. Provide grounding bushings and ground connections for all raceways terminating below equipment where there is no metal-to-metal continuity.
- H. Continuity between all metallic and non-metallic raceway systems and equipment shall be maintained.

2.11 SEALS

A. Water Tight Seals

- 1. Conduits entering from the exterior or below grade shall have water tight fittings on the outside and on the inside of the conduit.
 - a. Fittings on the outside of the conduit shall be O-Z Gedney type FSK or approved equal. Provide type WSK if penetration is within two feet of the high water table. Provide grounding attachment.
 - b. Fittings on the inside of the conduit shall be O-Z Gedney type CSBI or approved equal. Provide type CSBG if penetration is within two feet of the high water table. Provide a blank fitting to seal spare or empty conduits.
 - c. O-Z Gedney type CSM fitting may be used when sealing within a sleeve or cored hole.
- 2. Submit on seals to be used.

B. Environmental Seals

- 1. Provide seals on raceways exposed to widely different temperatures, as in refrigerating or cold storage areas. Install seal to prevent circulation of air from warmer to colder sections through the raceway.

C. Hazardous Area Seals

- 1. Provide explosion proof seals as required by the Electric Code.

D. Smoke and Fire Stopping Seals

- 1. Provide a seal around raceways or cables penetrating full height walls (slab to slab), floors or ventilation or air handling ducts so that the spread of fire or products of combustion shall not be substantially increased.

2. Penetrations through fire-resistant-rated walls, partitions, floors or ceilings shall be firestopped using approved methods and NRTL listed products to maintain the fire resistance rating.
3. Fire stopping in sleeves or in areas that may require the addition or modification of installed cables or raceways shall be a soft, pliable, non-hardening fire stop putty. Putty shall be water resistant and intumescent. Provide for all sleeves and raceways.
4. Firestopping in locations not likely to require frequent modification shall be NRTL listed putty, caulk or mortar to meet the required fire resistant rating.
5. Box penetrations into a fire rated wall or shaft shall have a fire stopping pad installed on the back of the box.
6. Firestopping materials shall be NRTL listed to UL 1479 (ASTM E814). Installation methods shall conform to a UL firestopping system. Submit specifications and installation drawings for the type of material to be used. Firestopping materials shall be as manufactured by 3M, International Protective Coatings Corp., RayChem or approved equal.

PART 3 - EXECUTION

3.1 WORK COORDINATION AND JOB OPERATIONS

- A. Equipment shall not be installed in congested and possible problem areas without first coordinating installation of same with other trades. Relocate electrical equipment installed in congested or problem areas should it interfere with the proper installation of equipment to be installed by other trades.
- B. Particular attention shall be directed to coordination of lighting fixtures and other electrically operated equipment requiring access which is to be installed in ceiling areas. Coordinate with other trades, the elevations of equipment in hung ceiling areas to insure adequate space for installation of recessed fixtures before said equipment is installed. Conflicts in mounting heights and clearances above hung ceilings for installation of recessed lighting fixtures or other electrically operated equipment requiring access shall be brought to the attention of Architect/Engineer for a decision prior to equipment installation.
- C. Furnish to contractors information relative to portions of electrical installation that will affect other trades sufficiently in advance so that they may plan their work and installation.
- D. Obtain from other trades information relative to electrical work which he, this contractor, is to execute in conjunction with installation of other trades' equipment.
- E. Provide coordination drawings as specified in Division 1 – General Requirements.

3.2 PLANS AND SPECIFICATIONS

A. Plans:

1. Drawings showing layout of electrical systems indicate approximate location of raceways, outlets and apparatus. Runs of feeders and branch circuits are schematic and are not intended to show exact routing. Final determination as to routing shall be governed by structural conditions and other obstructions.

B. Specifications:

1. Specifications supplement drawings and provide specifics pertaining to methods and material to be used.

3.3 IDENTIFICATION

A. Equipment shall be marked for ease of identification as follows.

1. Provide screw-on nameplates on switchboards, panelboards, fire alarm terminal cabinets, starters, and disconnect switches. Nameplates to be of black phenolic with white engraving. For starters and disconnect switches lettering shall be a minimum of ¼ in. high. Nameplates on panelboards shall have the following information.
 - a. Line 1 - Panel designation in ½ in. high letters.
 - b. Line 2 - Utilization voltage in 3/8 in. high letters.
 - c. Line 3 - Distribution source "Fed from " in ¼ in. high letters.
2. Neatly typed directory cards listing circuit designations shall be fastened inside the cover of panelboards. Spare circuits shall be penciled.
3. Color coding schedules. If there is more than a single system voltage, different voltages shall have secondary switchboard and distribution panel and shall be of the phenolic nameplate type as previously specified. A typewritten color code schedule shall also be affixed, under plastic, inside each panelboard door.
4. Outlet boxes both concealed and exposed shall be identified as to panel origination and circuit number by means of fibre pen on the inside of coverplate.
5. Special system outlet boxes concealed above hung ceilings shall be identified as to system by spray painting during roughing. The following systems shall be identified.
 - a. Fire Alarm - red.
 - b. Emergency - yellow.
6. All conductors in boxes larger than standard outlet boxes, in all wireways, trench headers, etc. shall be grouped logically and be identified.
7. Grounding conductors and neutrals shall be labeled in panels, wireways, etc. as to circuits associated with.

3.4 PROTECTION AND CLEANUP

A. Protection:

1. Materials and equipment shall be suitably stored and protected from weather.
2. During progress of work, pipe and equipment openings shall be temporarily closed so as to prevent obstruction and damage.
3. Be responsible for maintenance and protection of material and equipment until final acceptance.

B. Cleanup:

1. Keep job site free from accumulation of waste material and rubbish. Remove all rubbish, construction equipment, and surplus materials from site and leave premises in a clean condition.
2. At completion, equipment with factory finished surfaces shall be cleaned and damaged spots touched up with the same type paint applied at factory.
3. Particular attention is called to Section 110-12(c) of the NEC, which requires that internal parts of electrical equipment not be contaminated by construction operations.

3.5 PORTABLE OR DETACHABLE PARTS

- #### A.
- Retain possession of and be responsible for spare parts, portable and detachable parts, and other removable portions of installation including fuses, keys, locks, blocking clips, inserts, lamps, instructions, drawings, and other devices or materials that are relative to and necessary for proper operation and maintenance of the system until final acceptance, at which time such parts shall be installed or turned over to the Owner, as the case may be.

3.6 SAFETY PRECAUTIONS

- #### A.
- Provide proper guards, signage, and other necessary construction required for prevention of accidents and to insure safety of life and property. Remove any temporary safety precautions at completion.

3.7 MOUNTING HEIGHTS

- #### A.
- All electrical equipment shall be mounted at the following heights unless noted or detailed otherwise on drawings. Notes on Architectural drawings shall supersede those noted below or detailed on the electrical drawings. If mounting height of an electrical component is questionable, obtain clarification from Architect before installation.
1. Duplex convenience outlets - 18 inches.
 2. Light switches and all other toggle or control switches for the operation of heating, ventilating, and air conditioning, plumbing, and general service - 48 inches.
 3. Fire alarm pullstations - 48 inches.

4. Fire alarm audio visual signals - 80 inches or 6 inches below ceiling, whichever is lower.
 5. Panelboards for lighting, power, telephone, and other auxiliary systems – 78 in. to top.
 6. Equipment located in lobbies shall be located as detailed on Architectural drawings or as directed by Architect/Engineer.
 7. All receptacles, light switches and fire alarm signals sharing a common location shall be symmetrically arranged.
- B. Mounting heights given are from finished floor to centerline. In the case of a raised floor, surface of raised floor is the finished floor. Electrical Contractor is responsible for reviewing the Architectural Drawings and coordinating all mounting heights within elevations shown on the Architectural Drawings.

3.8 WORKMANSHIP AND INSTALLATION METHODS

- A. Work shall be installed in first-class manner consistent with best current trade practices. Equipment shall be securely installed plumb and/or level. Flush-mounted outlet boxes shall have front edge flush with finished wall surface. No electrical equipment shall be supported by work of other trades. Cable systems shall be supported and not draped over ducts and piping or laid on ceiling suspension members. Lighting fixtures shall be installed to agree with Architects reflected ceiling plans.
- B. Supports:
1. Support work in accordance with best industry practice and by use of standard fittings.
 2. In general, walls and partitions will not be suitable for supporting weight of panelboards, dry type transformers and the like. Provide supporting frames or racks extending from floor slab to structure above.
 3. Provide supporting frames or racks for equipment, intended for vertical surface mounting in free-standing position where no walls exist.
 4. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members, rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of equipment.
 5. Provide $\frac{3}{4}$ in. thick painted plywood mounting surfaces in all electric and telephone areas and for all equipment on freestanding racks. All plywood shall be fire retardant and painted both sides and edges with two coats of white paint.
 6. No work for exposed installations in damp locations shall be mounted directly on any building surface. In such locations, flat bar members or spacers shall be used to create a minimum of $\frac{1}{4}$ in. air space between building surfaces and work.
 7. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric raceways or cables for support. All outlet, pull, and junction boxes shall be independently supported.
 8. Nothing shall rest on, or depend for support on, suspended ceiling or its mounting members.

9. Support surface or pendant mounted lighting fixtures:
 - a. From outlet box by means of an interposed metal strap, where weight is less than five pounds.
 - b. From outlet box by means of a hickey or other direct threaded connection, where weight is from five to fifty pounds.
 - c. Directly from structural slab, deck or framing member, where weight exceeds fifty pounds.
 - d. Pendant lighting fixtures shall be supported by threaded rods in non-public areas and by manufacturer's standard tube hangers with swivel aligner and canopy in public areas. Provide non-standard pendant lengths where required to mount fixtures at elevations either called for on drawings or as shown in Architectural elevations.
 10. Support recessed lighting fixtures directly from structural slabs, decks or framing members, by means of jack chain or air craft cable, one at each end of fixture at opposite corners.
 11. Where support members must of necessity penetrate air ducts, provide airtight sealing provisions which allow for a relative movement between the support members and the duct walls.
 12. Provide channel sills or skids for leveling and support of all floor mounted electrical equipment.
 13. Where permitted loading is exceeded by direct application of electrical equipment to a slab or deck, provide proper dunnage as required to distribute the weight in a safe manner.
 14. Support metallic raceways by either running within steel frame or hung from the building frame. Anything hung from building frame shall be attached with metallic fasteners.
- C. Fastenings:
1. Fasten electric work to building structure in accordance with the best industry practice.
 2. Where weight applied to attachment points is 100 pounds or less, fasten to building elements of:
 - a. Wood -- with wood screws.
 - b. Concrete and solid masonry -- with bolts and expansion shields.
 - c. Hollow construction -- with toggle bolts.
 - d. Solid metal -- with machine screws in tapped holes or with welded studs.
 3. Where weight applied to attachment points exceeds 100 pounds, fasten as follows:
 - a. At field poured concrete slabs, provide inserts with 18 in. minimum length slip-through steel rods, set transverse to reinforcing steel.

- b. Where building is steel framed, utilize suitable auxiliary channel or angle iron bridging between structural steel elements to establish fastening points. Bridging members shall be suitably welded or clamped to building steel. Provide threaded rods or bolts to attach to bridging members.
 - 4. Floor mounted equipment shall not be held in place solely by its own dead weight. Provide floor anchor fastenings. Floor mounted equipment over 72 inches in height shall also be braced to nearest wall or overhead structural elements.
 - 5. For items which are shown as being mounted at locations where fastenings to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging to building structural elements.
 - 6. Fastenings for metallic raceways using the fastening as support shall be of the metallic type. Fastenings to hold raceways or cables in place may be via tyrap.
- D. General Raceway Installation:
- 1. Install the various types of raceways in permitted locations as previously specified. All raceways shall be run concealed. Consult Architect for instruction for raceways which must be exposed in public spaces.
 - 2. Raceways for normal-emergency or emergency only wiring cannot contain other conductors.
 - 3. Raceways shall be properly aligned, grouped, and supported in accordance with code. Exposed raceways shall be installed at right angles to or parallel with structural members. Concealed raceways may take most direct route between outlets.
 - 4. Raceways run on trapeze hangers shall be secured to the trapeze.
 - 5. Raceways shall be continuous and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from service to all outlets. Provide grounding bushings and bonding jumpers where raceways attach to painted enclosures or terminate below equipment.
 - 6. Where raceways enter boxes, cabinets, tap boxes, other than those having threaded hubs, a standard locknut shall be used on the outside and locknut and bushing on the inside.
 - 7. Where raceways terminate below equipment and there is no direct metal to metal continuity, provide grounding bushings on raceways and interconnect with equipment grounding conductor.
 - 8. All empty raceways shall be provided with a pull wire.
 - 9. All raceway sleeves, stub-ups, or stub-outs, where not connected to a box or cabinet, shall be terminated with a bushing.
 - 10. All raceway joints shall be made up tight and no running threads will be permitted.
 - 11. Where raceways are cut, the inside edge shall be reamed smooth to prevent injury to conductors.
 - 12. All vertical raceways passing through floor slabs shall be supported.
 - 13. Raceways shall not be installed in concrete slabs above grade or below waterproofed slabs.

14. Electric raceways and/or sleeves passing through floors or walls shall be of such size and in such location as not to impair strength of construction. Where raceways alter structural strength or the installation is questionable, the structural engineer shall be contacted for approval.
15. Raceways shall not run directly above or below heat producing apparatus such as boilers, nor shall raceways run parallel within 6 inches of heated pipes. Raceways crossing heated pipes shall maintain at least a 1-inch space from them.
16. Raceways shall be installed in such a manner as to prevent collection of trapped condensates, and all runs shall be arranged to drain.
17. Where two alternate wiring methods interconnect such as EMT to flexible metal conduit, an outlet box shall be provided.
18. All empty raceways entering building and all sleeves or core drilled openings through floors shall be sealed.

E. General Outlet Box Installation:

1. Boxes shall be set flush with finish surface and provided with proper type extension rings or plaster covers. Thru the wall boxes are not permitted. Check device or fixture to be mounted to box to ensure box orientation is proper.
2. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operation.
3. Remove knockouts only as required and plug unused openings.
4. Where required for horizontal and vertical alignment of boxes in stud partitions, bar hangers spanning two studs shall be used. Device boxes for insertion type receptacles shall be provided with far side box supports where there are less than two entering nonflexible raceways, and where bar hangers are not provided.
5. Boxes flush mounted in fire rated partitions and on opposite sides of the partition shall be separated by a distance of 24 inches in accordance with UL listing for the box.
6. Locations of outlets indicated on drawings are approximate. For items exposed to view, refer to Architectural drawings and coordinate locations with masonry joints, panel joints, ceiling grids, structural members, etc.
7. In case of conflict with standard mounting heights and device alignment, consult Architect/Engineer prior to roughing.
8. Check all door swings on Architect/Engineer drawings to ensure lighting switches are installed on strike side of door.
9. The right to make any reasonable change in location of outlets prior to roughing is reserved by Architect/Engineer. "Reasonable change" shall be interpreted as movement within 10 feet of location shown.
10. Outlet boxes for use where surface metal raceways are allowed shall be of a type specifically designed to be used with such surface metal raceway systems.

F. Conductor Installation:

1. No conductors shall be pulled into individual raceways until such raceway system is complete and free of debris. No harmful lubricants shall be used to ease pulling.

2. All conductors shall be wired so that grounded conductor is unbroken; switches in all cases being connected in ungrounded conductor.
3. Connections throughout the entire job shall be made with solderless type devices of approved design satisfactory to Inspector of Wires.
4. All taps and splices shall be insulated equal to that of conductor insulation.
5. All conductors of each feeder in pull boxes etc. shall be grouped, tied together, supported, and identified.
6. All conductors in panelboards and other wiring enclosures shall be neatly formed and grouped.
7. All conductors of emergency only and/or normal/emergency shall be run in separate raceway systems to final outlet box.
8. Provide support for conductors in vertical raceways in accordance with Article 300-19.
9. Strip insulation from conductors with approved tools and only of sufficient length for proper termination. Cutting of conductor stranding is unacceptable.
10. Taps from paralleled conductors shall be of a type which tap each conductor, such as ILSCO "PTA" series.
11. Grounding conductors are to be identified as to associate power circuits.

G. Stranded Conductor Installation:

1. If Contractor selects stranded conductors for # 10 AWG and smaller, terminate such conductors as follows:
 - a. No stranded conductor may be terminated under a screwhead. Provide insulated terminal lugs for all screw connections equal to Thomas & Betts "STA-KON" type RC with forked tongue and turned up toes. Installation of lugs shall be done with compression tool such as T&B WT-145C which prevents opening of tool until full compression action is completed.
 - b. Backwired wiring devices shall be of clamp type; screw tightened. Force fit connections not allowed.
2. Stranded conductors will not be allowed for fire alarm work.

H. Accessibility:

1. Electrical equipment requiring service or manual operation shall be accessible.

I. Vibration Elimination:

1. All equipment connections to rotating equipment or equipment capable of vibration shall be made up by flexible raceways.

J. Wiring Device Gaskets:

1. Provide wiring device gaskets at coverplates where device is mounted in wall separating conditioned and non-conditioned spaces.

3.9 BRANCH CIRCUITS

- A. Provide all branch circuit wiring and outlets for a complete and operating system. The system shall consist of insulated conductors connected to the panelboards and run in raceways or as cable systems if permitted under products section, as required to the final outlet and shall include outlet boxes, supports, fittings, receptacles, plates, fuses, etc.
- B. Physical arrangement of branch circuit wiring shall correspond to circuit numbering on drawings. Combining of circuits and raceways will be allowed up to a 3 phase, 4 wire circuit in a single raceway, unless shared neutrals are not allowed by other sections of this Division, or are indicated as separate neutrals on the drawings. Any combination of homeruns such as this, however, shall be indicated on record drawings. Combining of conductors and raceways for tenant fitup work is allowed only for fitup boxes in accordance with details on drawings. When a common grounded conductor is used for more than one circuit, the arrangement shall be such that a receptacle, fixture, or other device may be removed or disconnected without disconnecting the grounded conductor for other circuits. Ground fault circuit breakers shall be wired with separate neutrals and separate grounding conductors per circuit. A consistent phase orientation shall be adhered to throughout project at terminations.
- C. Circuits feeding three phase equipment shall not be combined into common raceways, unless specifically indicated.
- D. All wiring in panelboards and cabinets shall be neatly formed and grouped.

3.10 FIREPROOFING AND WATERPROOFING

- A. Fireproof and waterproof all openings in slabs and walls.

3.11 CUTTING AND PATCHING

- A. Cutting of surfaces, including core drilling of walls and slabs, shall be done by this contractor as mentioned previously. Openings through new wall surfaces will be provided by others.
- B. Patching will be provided by the trade responsible for the surface to be patched.

3.12 MECHANICAL SYSTEM COORDINATION

- A. The Mechanical System Subcontractor will be providing various items of mechanical services equipment and control apparatus. In general, this contractor shall connect up power wiring to this equipment and provide starters and disconnect switches.
- B. This contractor shall closely coordinate respective portions of work by other trades.

3.13 STORAGE AND INSTALLATION OF EQUIPMENT

- A. The electrical subcontractor shall store and install electrical equipment and wiring listed for dry locations.

END OF SECTION

DO NOT REMOVE
THIS PAGE INTENTIONALLY LEFT BLANK

SOUTHBRIDGE SENIOR CENTER KITCHEN STOVE

153 CHESTNUT STREET, SOUTHBRIDGE,
MA 01550



VOLUME1 OF1

DRAWINGS ISSUED FOR BIDDING AND CONSTRUCTION

NOVEMBER 12, 2024

KAESTLE BOOS ASSOCIATES, INC. KAESTLE BOOS
associates, inc ARCHITECTURAL

GGD CONSULTING ENGINEERS, INC.



MECHANICAL, ELECTRICAL, & PLUMBING ENGINEERING

TOCE STRUCTURAL ENGINEERING, LLC

STRUCTURAL ENGINEER

SEE THE LIST OF DRAWINGS FOR LOCATION OF ABBREVIATIONS RELATING TO OTHER DISCIPLINES

CABINET UNIT HEATER	CUH	OFFICE
CAPACITY	CAP	OPPOSITE-HAND
CARPET	CPT	OUNCE
CEILING	CLG	OUTSIDE
CEILING HEIGHT	CLG HT	OUTSIDE DIAMETER
CEMENT	CEM	OVERHEAD DOOR
CENTER	CTR	
CENTERLINE	CL	PAINTED
CERAMIC TILE	CTR	PAIR
CHAIN LINK FENCE	CLF	PAPER TOWEL DISPENSER
CHALKBOARD	CBD	PARTIAL
CLEAR	CLR	PERPENDICULAR
CLOSET	CLO	PLASTER
COLD HOOK	CPH	PLATE
COLD FORMED METAL FRAME	CFM	PLASTIC LAMINATE
COLUMN	COL	PLUMBING
COMBINATION PAPER TOWEL DISPENSER	CPTD	PLYWOOD
CONCRETE	CON	POLY VINYL CHLORIDE
CONCRETE MASONRY UNIT	CMU	PORCELAIN TILE PANEL
CONFERENCE	CONF	POUND/POUNDS
CONSTRUCTION	CONSTR	POURED RESIN BASE
CONSTRUCTION MANAGER	CM	POURED RESIN FLOOR
CONTINUOUS	CON	PRECAST CONCRETE
CONTRACT LIMIT LINE	CLL	PREPARED CEMENT
CONTRACTOR	CONTR	PRESSURE TREATED
CONTRACTOR/CONSTRUCTION JOINT	CJ	PROPERTY LINE
COORDINATE/COORDINATION	CNR	
CORNER	CNR	QUANTITY
CORNER GUARD	CG	
CORRIDOR	CR	RADIUS
COURSE, COURSES	CRS	RAIN LEADER
CRASH RAIL	CR	RAIN WATER CONDUCTOR
CURTAIN WALL	CW	RAIN WATER LEADER
CUSTODIAL	CUST	REFLECTED CEILING PLAN
		REINFORCE
DAMP/PROOFING	DMPF	REQUIRED
DEGREE	DET	RESILIENT BASE
DEPARTMENT	DEPT	RESILIENT TILE FLOORING
DEPTH	DEPT	REVISED, REVISION
DETENTION HOLLOW METAL DOOR	DTL	ROBE HOOK
DETENTION HOLLOW METAL FRAME	DMFM	ROOF ACCESS LADDER
DIAMETER	DIA	ROOF TOP UNIT
DIMENSION	DI	ROOM
DISHWASHER	DI	ROUGH OPENING
DISTANCE	DIST	RUBBER FLOORING
DIVISION	DIV	RUBBERIZED ASPHALT LAMINATE
DOOR	DR	
DOUBLE	DBL	SCHEDULE
DOUBLE HUNG	DH	SCUPPER
DOWN	DN	SECTION
DOWN SPOUT	DS	SEAMING JOINT
DRAWING	DWG	SIMILAR
DRINKING FOUNTAIN	DF	SOAP DISPENSER
DRYER	D	SOLID SURFACE
		SOUND TRANSMISSION GLASS
EACH	EA	SPECIFICATIONS
ELECTRIC, ELECTRICAL	ELEC	SPLASH BLOCK
ELECTRIC WATER COOLER	EW	SQUARE
ELEVATION	ELEV	SQUARE FEET (FOOT)
ELEVATOR	ELV	STAINLESS STEEL
EMERGENCY	EMER	STEEL
EMERGENCY EYEWASH/SHOWER	EEW	STANDARD
ENTRANCE FLOOR GRILL	EFG	STATIC CONTROL FLOORING
ENTRANCE FLOOR MAT	EFM	STONE
EPOXY RESIN COUNTERTOP	ER	STONE THRESHOLD
EQUAL	EQ	STORAGE
EQUIPMENT	EQUIP	STRUCTURAL
ETHYLENE-PROPYLENE-DIENE-MONOMER	EPDM	SUSPEND, SUSPENSION
EXHAUST FAN	EX	ST
EXISTING	EX	
EXISTING FAN COIL	EFC	TACK SURFACE
EXISTING FIRE BLANKET	EFB	TACKBOARD
EXISTING FIRE EXTINGUISHER	EFE	TEMPORARY
EXISTING ROOF DRAIN	ERD	TERRAZZO FLOORING
EXISTING TO REMAIN	ETR	THICK THICKNESS
EXPANSION	EXP	THROUGH
EXPANSION JOINT	EJ	TILE
EXTENSION	EXT	TILE BASE
EXTERIOR INSULATION AND FINISH SYSTEM	EIFS	TONGUE AND GROOVE
		TOP OF STEEL
FACE OF	FO	TOPICAL
FEET, FOOT	FT	
FIBERGLASS	FG	
FIBERGLASS FRAME	FGF	UL INC.
FIBER REINFORCED PLASTIC	FRP	ULTRA VIOLET
FINISH, FINISHED	FIN	UNIT HEATER
FINISH FLOOR ELEVATION	FIE	UNIT VENTILATOR
FINISHED FLOOR	FF	UNLESS NOTED OTHERWISE
FIRE BLANKET	FB	UNLESS OTHERWISE NOTED
FIRE BLANKET CABINET	FBC	
FIRE EXTINGUISHER	FE	VENT THROUGH ROOF
FIRE EXTINGUISHER CABINET	FCV	VERTICAL FIELD
FIRE RETARDANT TREATED	FRF	VERTICAL
FIREPROOFING	FFRFG	VINYL COMPOSITION TILE
FIXTURE	FXT	VINYL TILE
FLASH	FLSH	
FLOOR	FLR	WALL COVERING
FLOOR DRAIN	FLR DRN	WALL PROTECTION
FLOOR FIN	FLR FIN	WARNOOK HERSEY INTERTEK
FLOORING	FTG	WASHER
FOUNDATION	FDTN	WATERPROOFING
FURNISH, FURNISHED	FURN	WELDED WIRE FABRIC
		WIDTH
GAUGE	GA	WITHOUT
GALVANIZED	GALV	WITH
GENERAL CONTRACTOR	GC	WIND
GLASS FILM	GF	WOOD
GRAB BAR	GB	WOOD BASE
GYP	GYP	WOOD VENEER

GENERAL NOTES FOR LOCATION OF LEGENDS RELATING TO OTHER DISCIPLINES

780 CMR - 10TH EDITION MASSACHUSETTS BUILDING CODE

- 2021 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
- 2021 INTERNATIONAL MECHANICAL CODE (IMC)
- 2021 INTERNATIONAL PLUMBING CODE (IPC)
- 2023 NFPA 70 NATIONAL ELECTRICAL CODE (NEC)
- 2008/121 CMR AMB RULES AND REGULATIONS

MASSACHUSETTS FIRE PREVENTION CODE INCLUDING:

- 2021 NFPA 1 FIRE CODE

MASSACHUSETTS CMR 105 - DEPARTMENT OF PUBLIC HEALTH CURRENT OSHA

MASSACHUSETTS GENERAL STATUTES

TITLE II OF THE AMERICAN WITH DISABILITIES ACT (ADA)
INCLUDING THE 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN

SECTION 504, REHABILITATION ACT 1973 INCLUDING 504 REGULATIONS

ELECTRICAL

E1.01	ELECTRICAL SYMBOL LIST AND DETAILS
E1.02	FIRST FLOOR PLAN
E1.03	ROOF PLAN
ED1.01	MAIN LEVEL DEMOLITION PLAN

KAESTLE BOOS
associates, inc

20 Newman Avenue, Suite 2001-A, Rumford, RI 02916
Phone: 401-270-0365
Additional offices located in Connecticut and Massachusetts
Email: kba@kba-architects.com ▲ Web: www.kba-architects.com

R0.01 GENERAL INFORMATION AND CODE

S1.01 PART ROOF FRAMING PLAN

A1.00 DEMOLITION PLAN

A1.01 NEW CONSTRUCTION PLAN

P1.00 GAS PIPING PLAN - PLUMBING

M0.01 HVAC LEGEND, SCHEDULES, CONTROLS

VC-2 HVAC VIB

ELECTRICAL

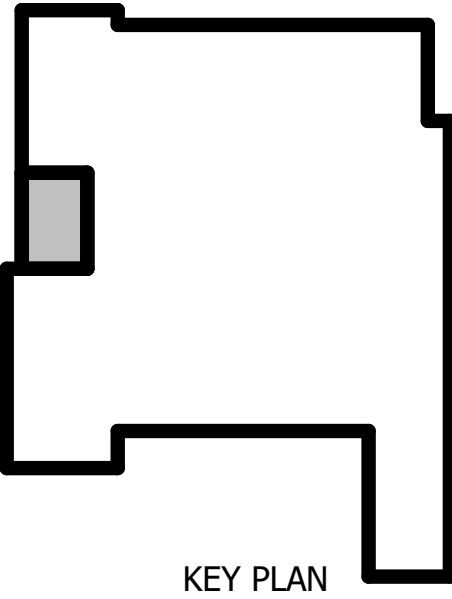
E1.01	ELECTRICAL SYMBOL LIST AND DETAILS
E1.02	FIRST FLOOR PLAN
E1.03	ROOF PLAN
ED1.01	MAIN LEVEL DEMOLITION PLAN

DESCRIPTION

12/2024 ISSUED FOR BID

DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN

SCALE: AS NOTED



SOUTHBRIDGE SENIOR CENTER KITCHEN STOVE

**153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550**

PROJECT NO.: 24011.00

DRAWN BY: Author

GENERAL INFORMATION AND CODE

DRAWING NC

R0.01

TOCE STRUCTURAL
ENGINEERING LLC

1755 Meriden Waterbury Turnpike
Unit 6, P.O. Box 365
Middale, CT 06467-0365
T:860-863-9978 F: 860-426-3174

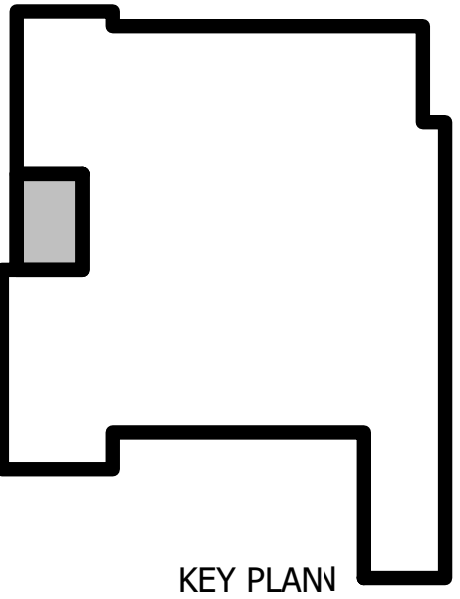
ISSUE DATE

DATE DESCRIPTION
11/12/2024 ISSUED FOR BID

REVISIONS

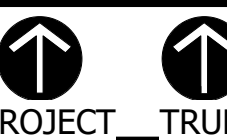
DATE DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN

SCALE: AS NOTED



SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE

153 Chestnut Street,
Southbridge, MA 01550

PROJECT NO.: 24196

DRAWN BY: DJT

Part Roof Framing
Plan

DRAWING NO.:

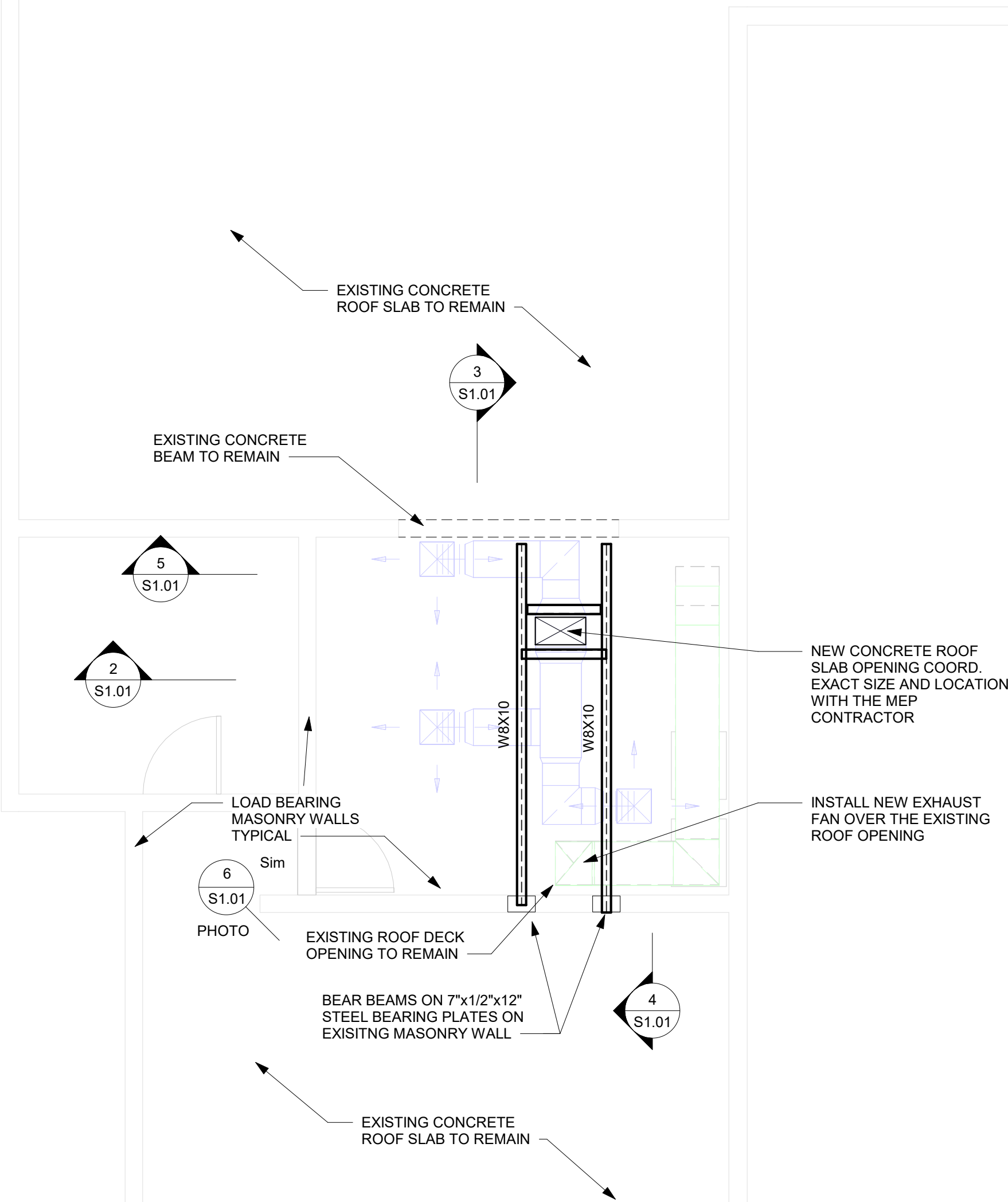
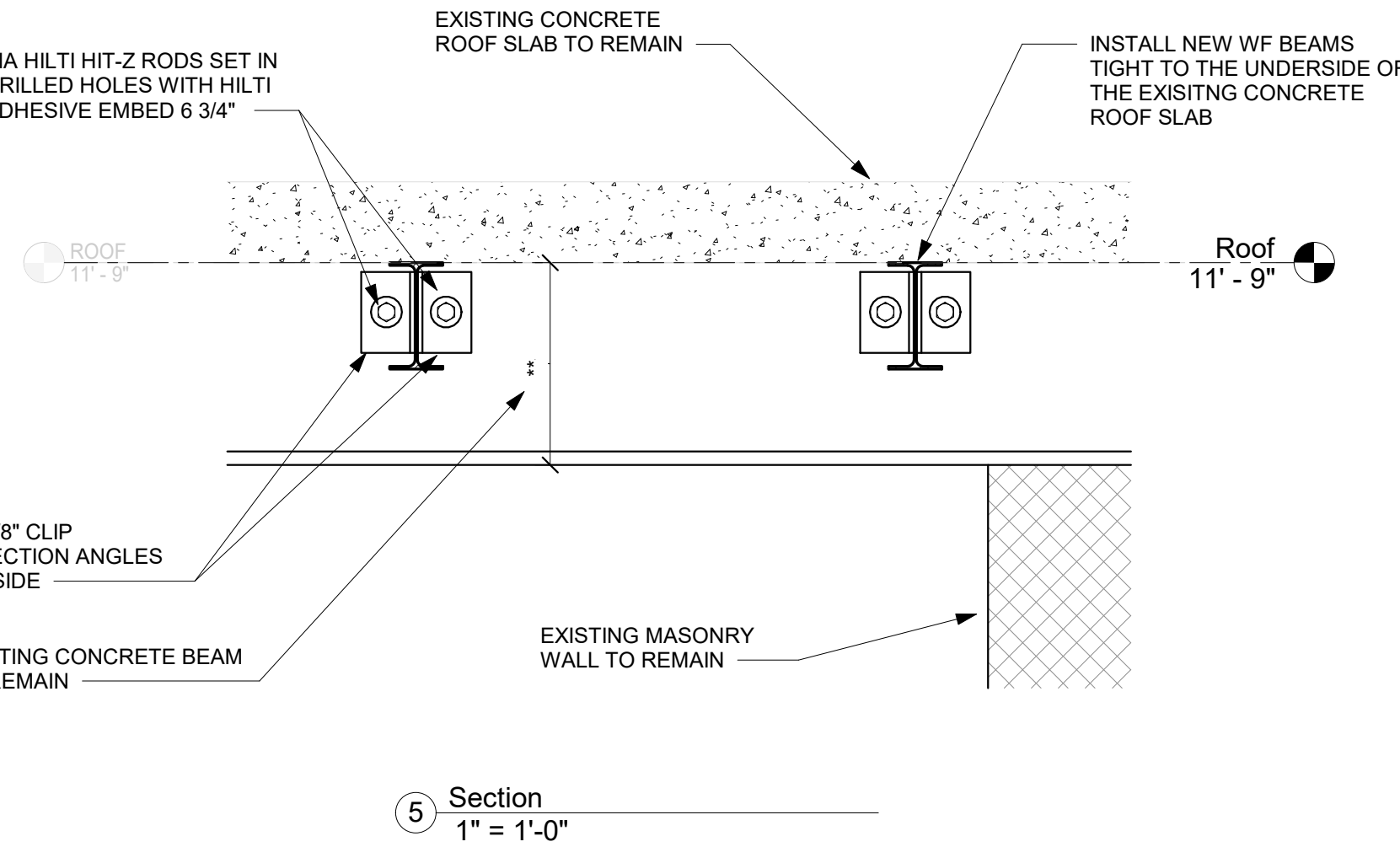
S1.01

STRUCTURAL STEEL

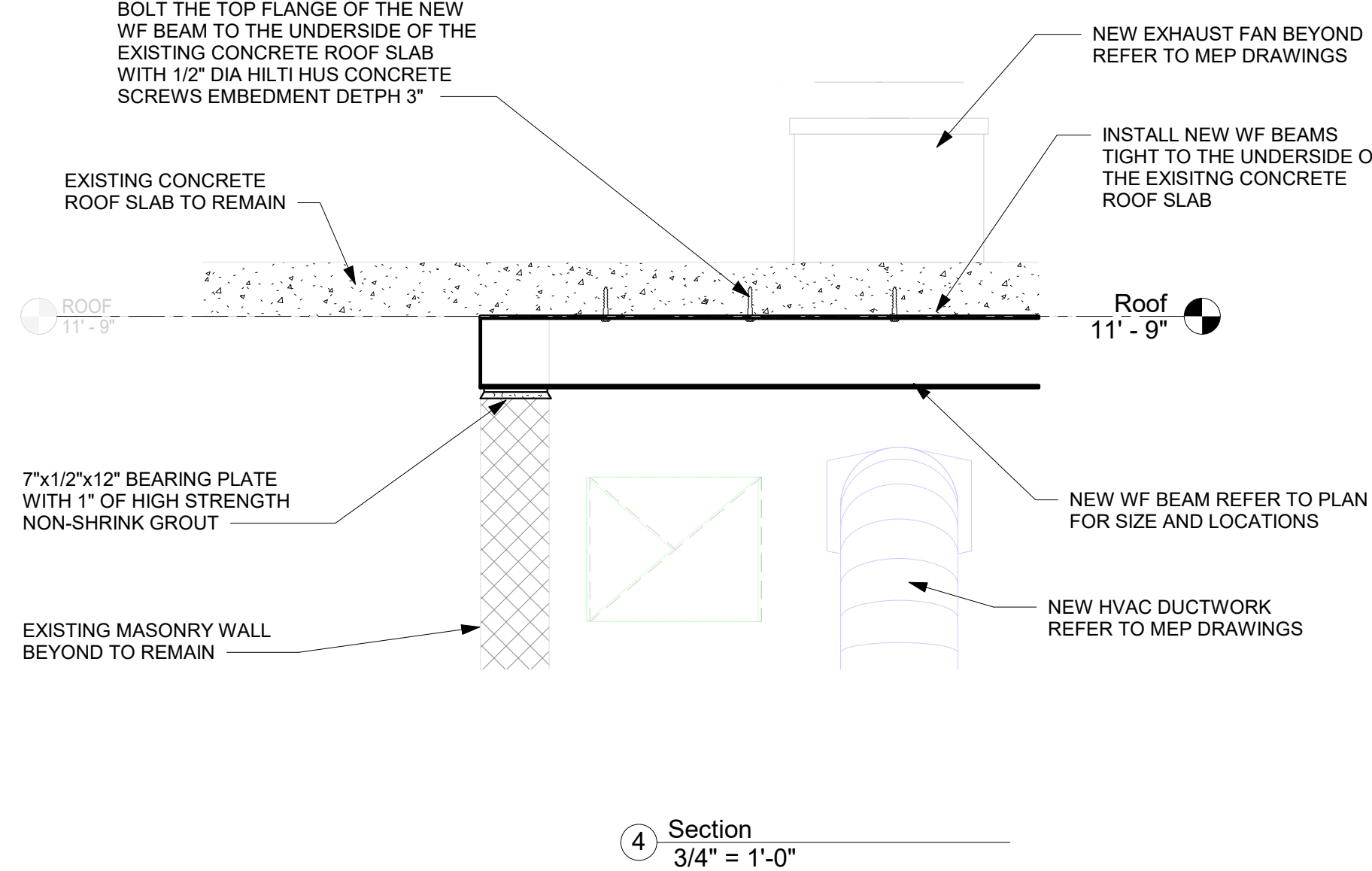
MATERIALS:
STRUCTURAL STEEL
ALL WITH SHAPES
STRUCTURAL STEEL TUBING
STRUCTURAL STEEL PIPE
BOLTS
ANCHOR BOLTS
WELDING ELECTRODE

ASTM A 36
ASTM A 992, GR. 50
ASTM A500, GRADE B
ASTM A53, GRADE B
ASTM A325
ASTM F1554
ASTM E 70

- DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS AISC 360-05 ASD
- WELDING SHALL CONFORM TO THE CODE FOR "ARC AND GAS WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY.
- PROVIDE SHOP DRAWINGS SHOWING PLAN LAYOUT, PIECE MARKS PROVIDING ALL DIMENSIONED AND DETAILED PIECES OF ALL THE STRUCTURAL STEEL FOR THE PROJECT.
- ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH A.W.S. STANDARDS.
- NO WELDING OR FINAL BOLTING SHALL BE DONE UNTIL AS MUCH OF THE STRUCTURE THAT WILL BE STIFFENED THEREBY HAS BEEN PROPERLY ALIGNED.
- SEQUENCE OF PLACING WELDS SHALL BE SUCH AS TO AVOID DISTORTION OF MEMBERS.
- SUBSTITUTION OF STRUCTURAL STEEL MEMBERS IS PERMITTED TO FACILITATE DELIVERY AT NO ADDITIONAL COST TO THE OWNER. SUBSTITUTED MEMBERS MUST BE OF THE SAME NOMINAL DEPTH AS THE MEMBER ORIGINALLY INDICATED AND HAVE A WEIGHT GREATER THAN THAT INDICATED. BEAM FLANGES MUST NOT INFRINGE ON ADJACENT ARCHITECTURAL ELEMENTS.



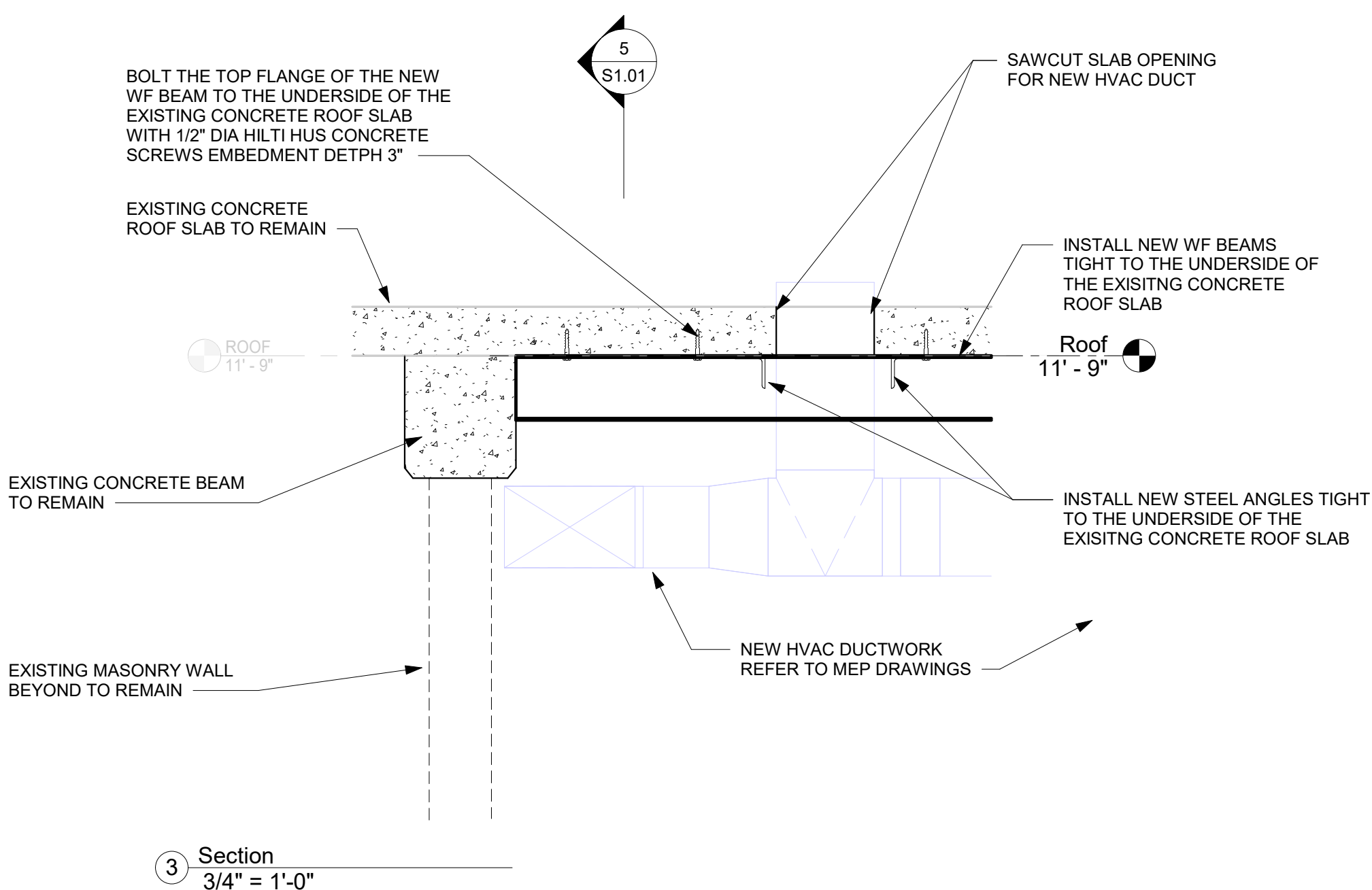
1 Part Roof Framing Plan
1/4" = 1'-0"



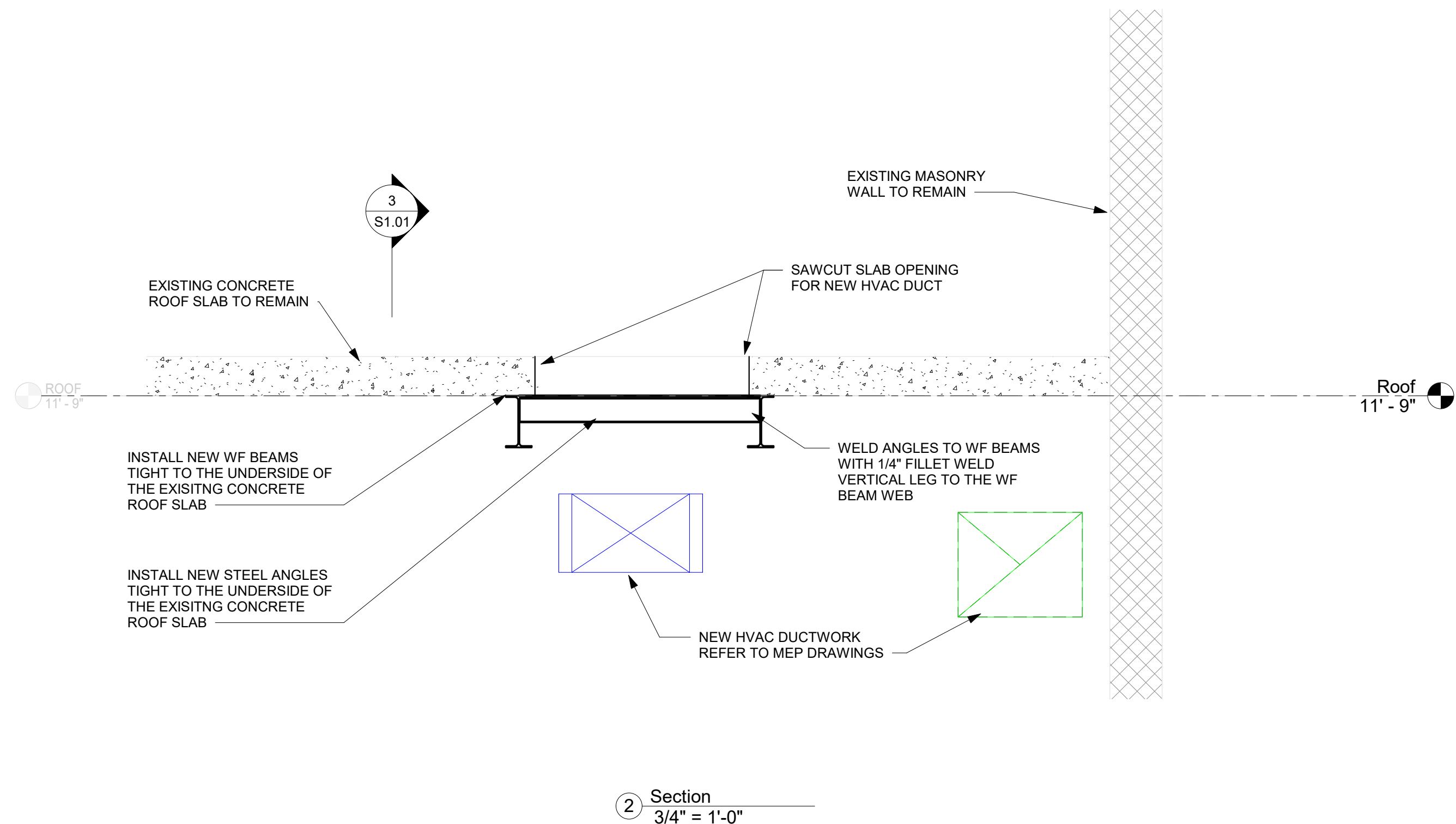
4 Section
3/4" = 1'-0"



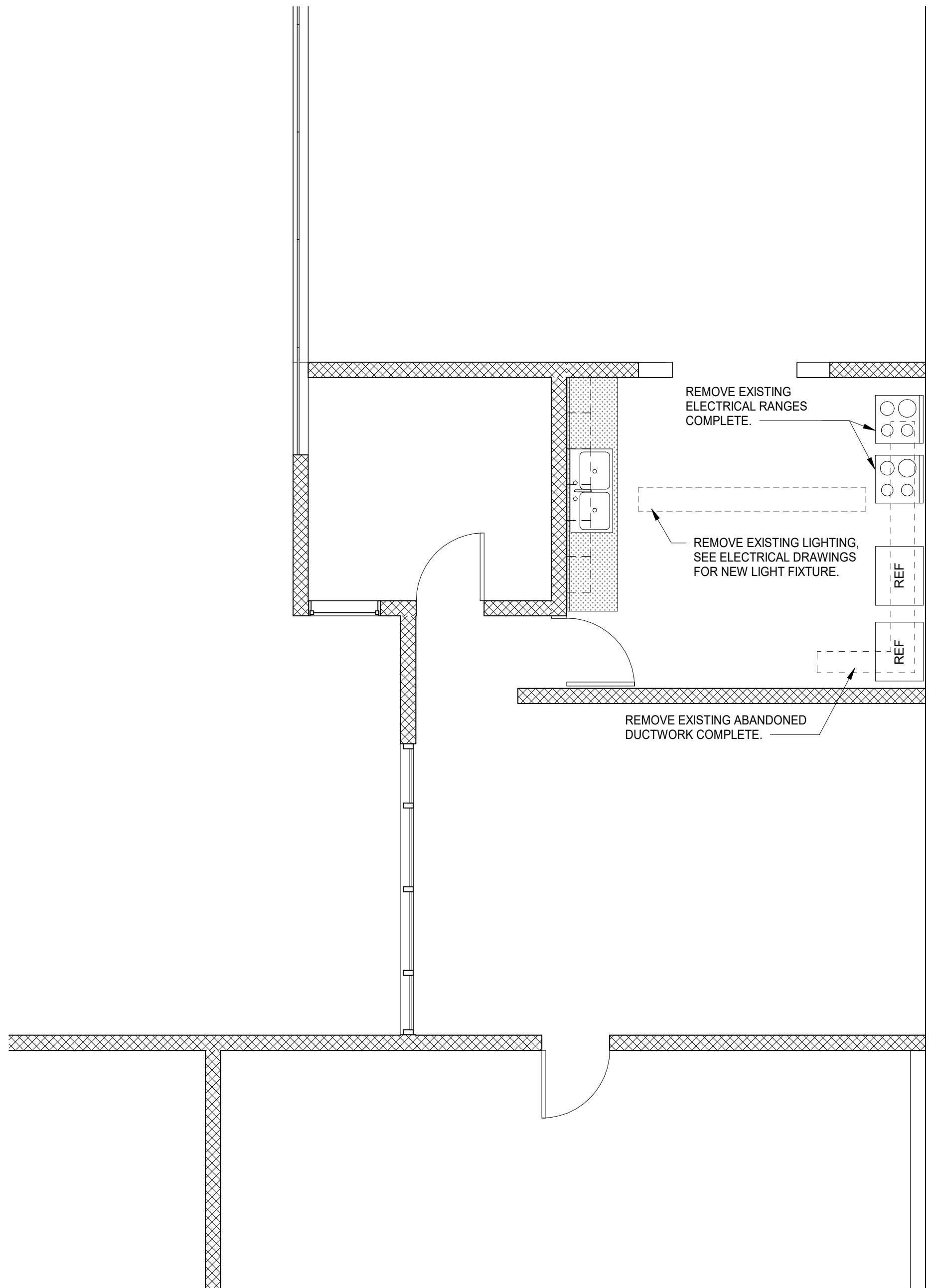
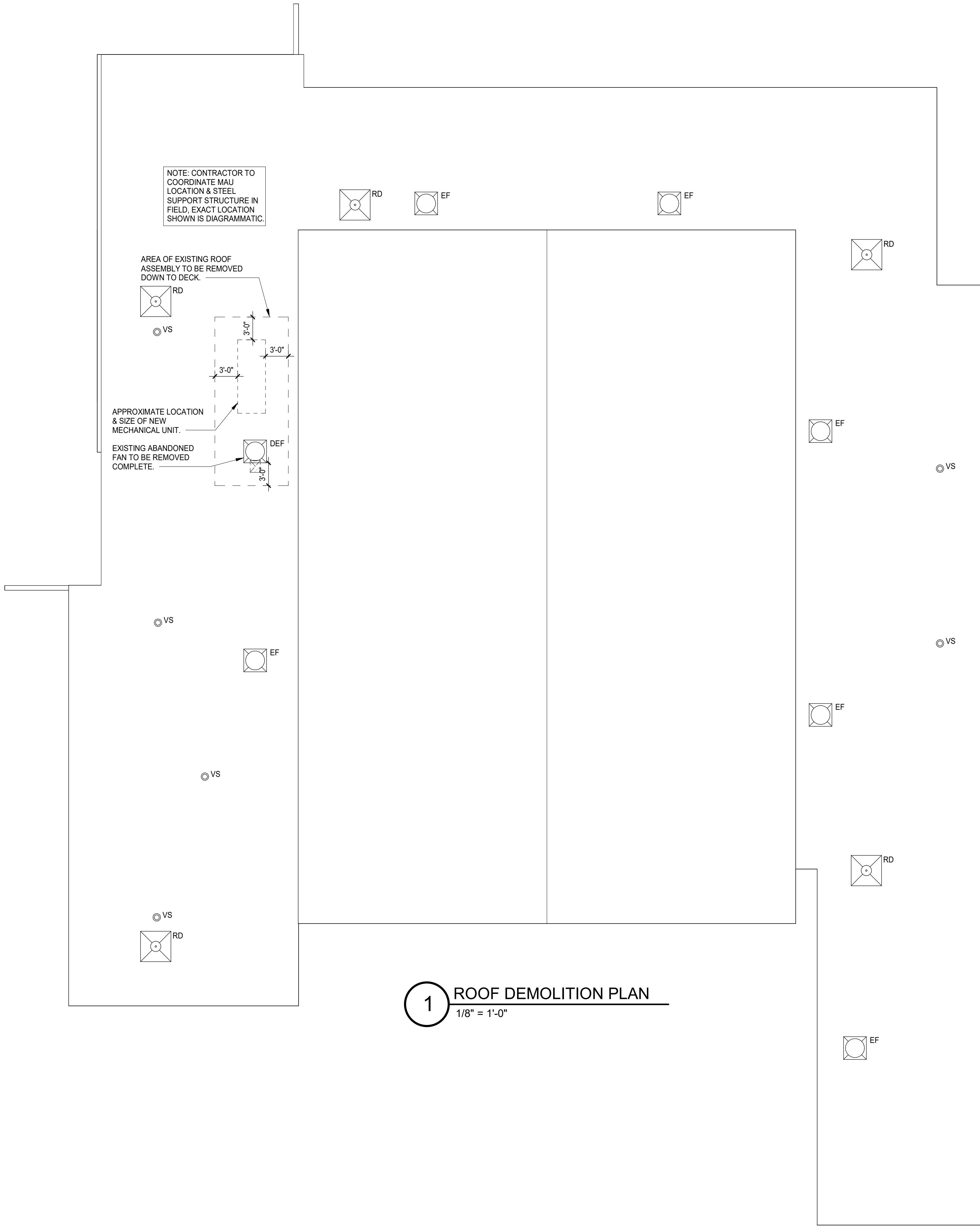
6 Existing Conditions Photo
3/8" = 1'-0"



3 Section
3/4" = 1'-0"



2 Section
3/4" = 1'-0"



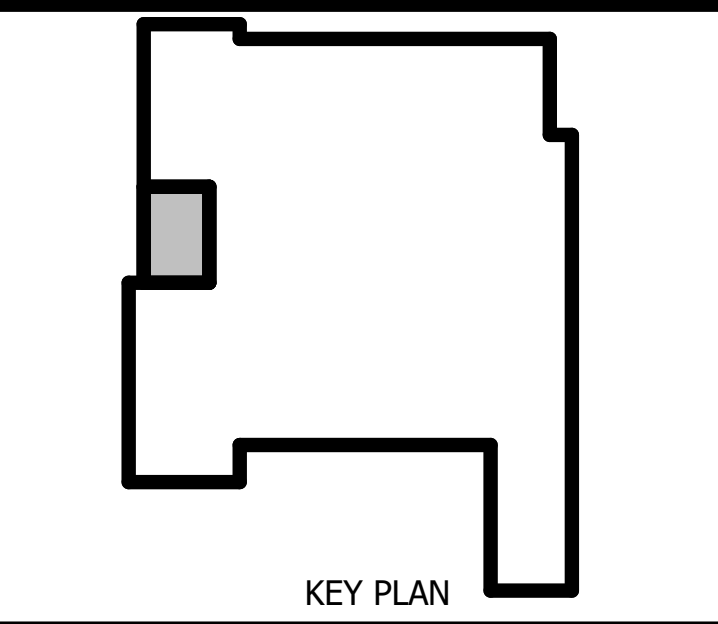
GENERAL DEMOLITION & PATCHING NOTES

1. THE DEMOLITION SHOWN ON THE PLANS IS DIAGRAMMATIC AND INTENDED TO SHOW THE GENERAL EXTENT OF THE WORK ONLY. CONTRACTOR TO INCLUDE ALL DEMOLITION, WHETHER SPECIFICALLY CALLED FOR OR NOT, THAT IS NECESSARY TO ACCOMPLISH THE INTENT OF THE PLANS AND SPECIFICATIONS.
2. REFER TO M/E/P & STRUCTURAL DRAWINGS FOR ALL DEVICES, EQUIPMENT, APPLIANCES, FIXTURES, ETC. SCHEDULED FOR DEMOLITION.
3. ALL OPENINGS WHERE EXISTING DUCTS, VENTS, PIPING OR ELECTRICAL CONDUIT HAVE BEEN REMOVED SHALL BE FILLED OR PATCHED TO MATCH EXISTING OR NEW FINISH DESIGNATION, INCLUDING FIRE RATINGS.
4. WHEREVER NEW OPENINGS ARE CREATED, ALL SURROUNDING FINISHES SHALL BE PATCHED TO MATCH ADJACENT FINISH, OR NEW FINISH DESIGNATED, INCLUDING ALL FLOOR PATCHING, REPAIR OR FILLING IS REQUIRED.
5. RELOCATE AS NECESSARY ANY PIPING, ELECTRICAL CONDUIT OR OTHER MECH OR ELEC DEVICES EXPOSED WHEN EXISTING WALLS, CEILINGS OR FLOORS ARE ALTERED OR PUNCTURED FOR NEW OPENINGS.
6. ALL AREAS OF FLOORS, WALLS AND CEILINGS DISTURBED FROM DEMOLITION SHALL BE FILLED OR PATCHED TO MATCH EXIST. OR NEW FINISH DESIGNATED. SPECIAL ATTENTION SHALL BE GIVEN TO AREAS BEHIND CASEWORK, TACK & MARKER BOARDS, LOCKERS & PLUMBING CHASES WHICH ARE PRESENTLY CONCEALED.
7. CONTRACTOR TO COORDINATE & FIELD VERIFY THE EXTENT OF ALL NEW OPENINGS IN EXISTING ROOF, FLOORS & WALLS PRIOR TO ANY RELATED DEMOLITION.
8. ALL FLOOR & ROOF AREAS IN EXISTING BUILDINGS REMOVED FOR THE INSTALLATION OF M/E/P/FP & STRUCTURAL INSTALLATIONS AND/OR MODIFICATIONS, SHALL BE PATCHED FLUSH WITH EXIST. SURFACES AND SHALL MAINTAIN ALL RATINGS. G.C. IS RESPONSIBLE FOR OBTAINING AS-BUILT DRAWINGS OR SITE INVESTIGATIONS TO AVOID CONFLICT WITH EXISTING BUILDING SYSTEMS. COORDINATE WITH M/E/P/FP & STRUCTURAL DRAWINGS.
9. GENERAL CONTRACTOR TO SAW CUT ALL MASONRY OPENINGS IN EXISTING WALLS UNLESS OTHERWISE NOTED.
10. REMOVE PORTION OF MASONRY WALL AS REQD FOR INSTALLATION OF NEW OPENING OVERBOLUSH AND TOOTH BACK IN MATERIAL TO MATCH EXISTING. COORDINATE W/ ARCHITECTURAL FLOOR PLANS FOR EXTENT OF DEMOLITION (TYP. IN ALL EXTERIOR MASONRY WALLS).
11. CONTRACTOR SHALL GIVE OWNER SUFFICIENT NOTIFICATION AND CLEAR IDENTIFICATION OF ITEMS REQUIRING RELOCATION PRIOR TO ANY DEMOLITION OR CONSTRUCTION IN THESE AREAS. CONTRACTOR TO DISCONNECT & MAKE SAFE ALL ELECTRICAL EQUIPMENT FOR OWNERS STAFF TO REMOVE & RELOCATE.
12. DEMOLITION OF ALL ITEMS WHICH ARE SHOWN AS DASHED LINES IS TYPICAL FOR THE COMPLETE PROJECT AND SHALL BE REMOVED WHETHER IT IS SPECIFICALLY IDENTIFIED AS REMOVED WITH A DEMOLITION NOTE OR NOT.
13. REMOVE ALL WALL, FLOOR OR CEILING MOUNTED ACCESSORIES INCLUDING: SPEAKERS, CLOCKS, PROJECTION SCREENS, WINDOW TREATMENTS, BELLS, FIRE PROTECTION EQUIPMENT, EXIT SIGNS, CHALK, MARKER & TACKBOARDS. PATCH & REPAIR WALLS TO RECEIVE NEW FINISHES.
14. ALL REMOVED ITEMS SHALL REMAIN THE OWNER'S PROPERTY OR BE DISPOSED OF BY THE G.C. AFTER OWNERS REVIEW.
15. CAP & MAKE SAFE ALL UTILITIES. - REFER TO M.E.P. SERIES DOCUMENTS FOR DEMOLITION OF UTILITIES.
16. REMOVE ALL CONDUITS, PIPES, EQUIPMENT AND DEVICES ATTACHED TO EXISTING STEEL SCHEDULED TO BE REMOVED &/OR ABANDONED & NOT USED FOR NEW WORK.
17. REMOVE AS NECESSARY ANY EXISTING PIPING, ELECTRICAL CONDUIT OR OTHER MECHANICAL/ELECTRICAL DEVICES EXPOSED WHEN EXISTING WALLS, CEILINGS, OR FLOORS ARE ALTERED OR PUNCTURED FOR NEW OPENINGS. COORDINATE WITH MEP DRAWINGS FOR SALVAGE REQUIREMENTS OF EXISTING SYSTEMS.
18. ALL AREAS OF FLOORS, WALLS, AND CEILINGS DISTURBED FROM DEMOLITION ARE TO BE FILLED OR PATCHED TO MATCH EXISTING OR NEW ADJACENT FINISH DESIGNATION, INCLUDING FIRE RATINGS.
19. CONTRACTOR TO REFER TO FLOOR PLANS AND DETAILS PRIOR TO CUTTING OPENINGS IN EXISTING WALLS.
20. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING BUILDING SYSTEMS PRIOR TO DEMOLITION OF FLOOR AND WALL AREAS REQUIRED FOR THE INSTALLATION OF NEW STRUCTURAL, FIRE PROTECTION, MECHANICAL, AND ELECTRICAL SYSTEMS.
21. WHERE NEW OPENINGS ARE CREATED IN EXISTING CONSTRUCTION, PATCH SURROUNDING FINISHES TO MATCH EXISTING OR NEW FINISH DESIGNATION, INCLUDING FIRE RATINGS.
22. REFER TO STRUCTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR RESPECTIVE DEMOLITION REQUIREMENTS.
23. ANY ITEM TO BE SALVAGED WILL BE TAGGED BY THE OWNER PRIOR TO DEMOLITION.

ISSUE DATE	
DATE	DESCRIPTION
11/12/2024	ISSUED FOR BID

REVISIONS	
DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



SCALE: AS NOTED PROJECT TRUE

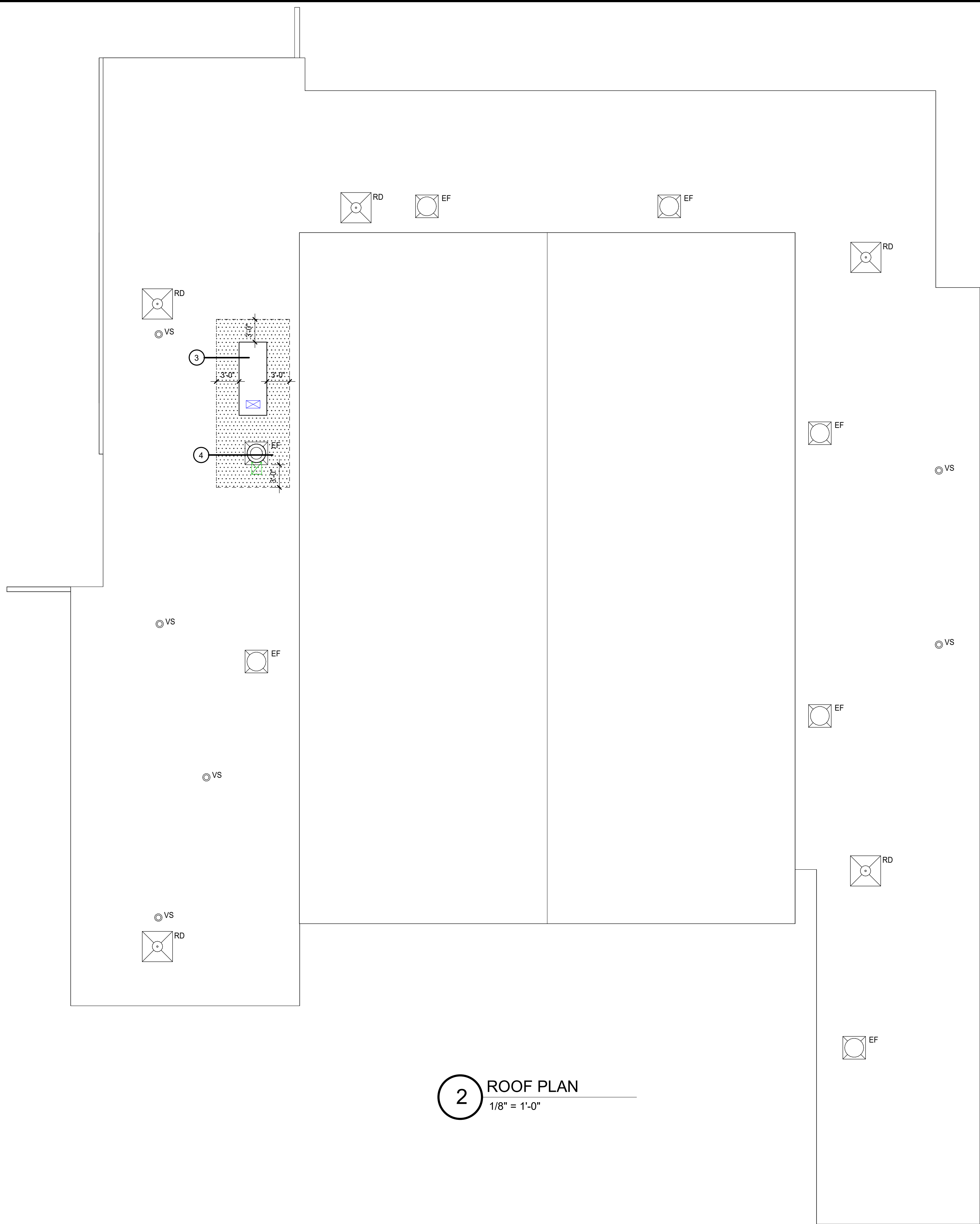


**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

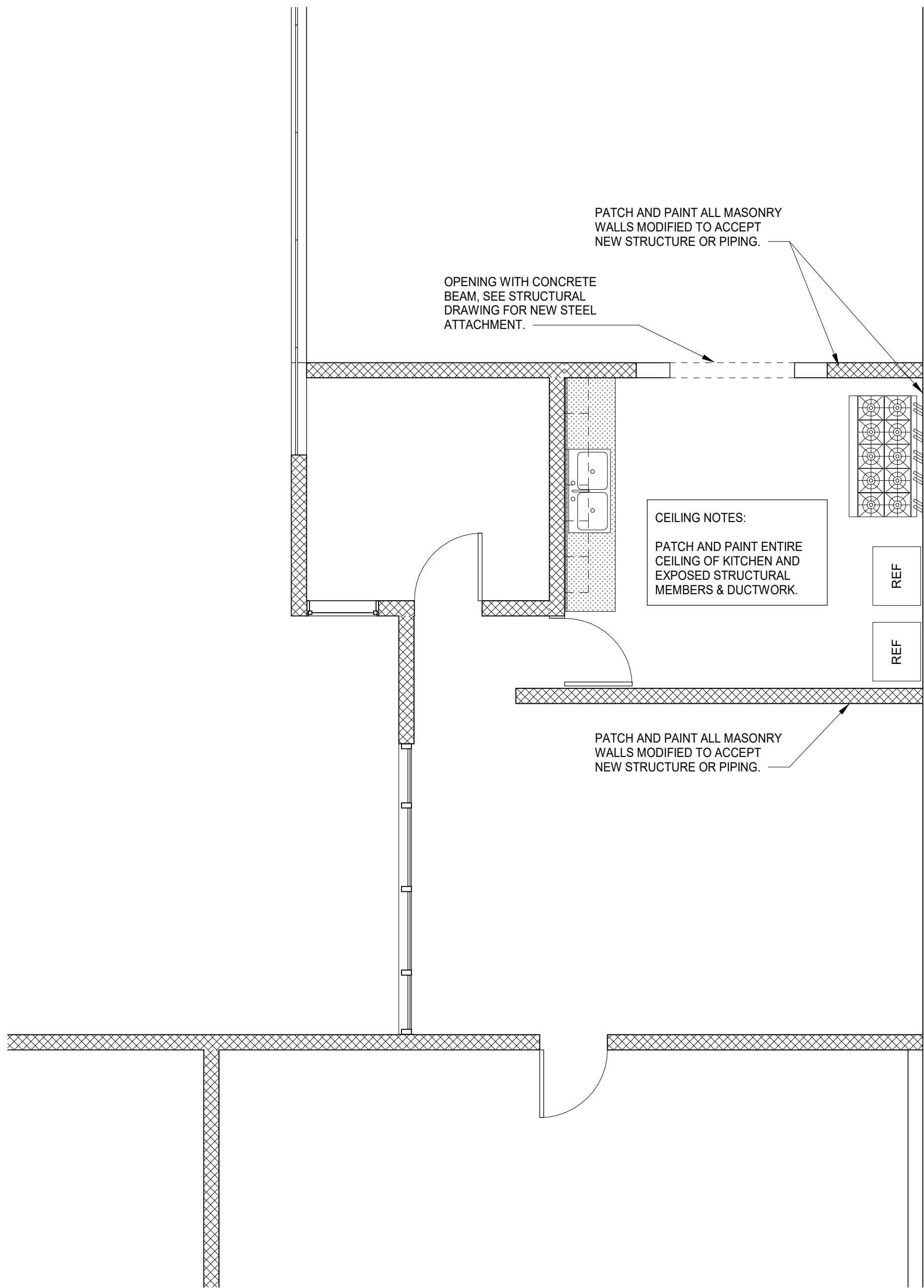
PROJECT NO.: 24011.00 DRAWN BY: CR/MTK

DEMOLITION PLAN

DRAWING NO.:
A1.00

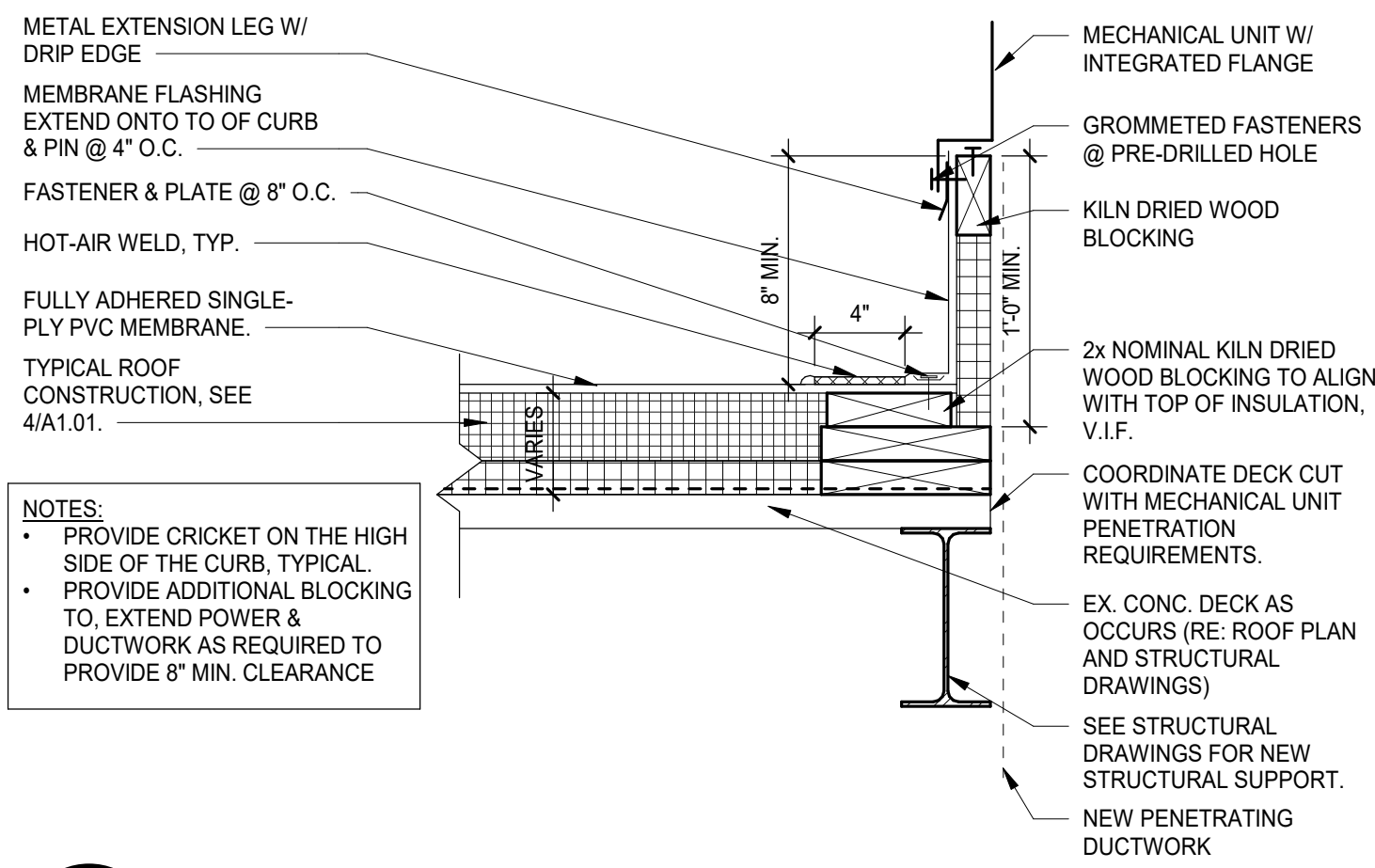


1 MAIN LEVEL FLOOR PLAN NEW CONSTRUCTION
1/4" = 1'-0"



3 EQUIPMENT CURB
1 1/2" = 1'-0"

SYMBOLS LEGENDS	
FLOOR PLAN LEGEND	
	ROOF DETAIL
	FIRE EXTINGUISHER
	HANDICAPPED ACCESSIBLE AREA OR EXIT
	AREA OF REFUGE OR AREA ASSEMBLY SEATING POSITION
	NEW DOOR AND FRAME ASSEMBLY
	CASEWORK, SEE A10 & A11 SERIES
	HANDICAP TURN RADIUS
	FACE BRICK VENEER
	CONCRETE MASONRY
	CONCRETE MASONRY GROUTED SOLID
	METAL STUD AND GYPSUM BOARD WALL
NOTE: • SEE GENERAL NOTES FOR LOCATION OF LEGENDS RELATING TO OTHER DISCIPLINES • DIMENSIONS TAKEN FROM FACE OF CMU / FACE OF MTL. STUD	



4 KITCHEN EXHAUST FLAT ROOF
1 1/2" = 1'-0"

ROOF PLAN LEGEND	
NOTE: REFER TO ROOF CONSTRUCTION TYPE KEY AND KEY PLAN FOR PROJECT SPECIFIC ROOF ASSEMBLIES	
	AREA OF TAPERED INSULATION ON FLAT CONSTRUCTION
	EXISTING ROOF DRAIN
	EXISTING VENT STACK
	NEW EXHAUST FAN
	DISTRIBUTION BOX
NOT ALL SYMBOLS MAY BE USED ON THIS PROJECT. SEE REPRESENTATIVE DRAWINGS FOR ACTUAL SYMBOLS USED.	

ROOF DEMOLITION NOTES	
1. ALL NOTES AND DIMENSIONS DESIGNATED AS TYPICAL APPLY TO ALL LIKE OR SIMILAR CONDITIONS THROUGHOUT THE PROJECT. 2. CONTRACTOR TO TAKE AND VERIFY ALL DIMENSIONS AND CONDITIONS ON THE JOB AS DEFINED IN CONTRACT DOCUMENTS. PROCEEDING WITH WORK CONSTITUTES ACCEPTANCE OF EXISTING CONDITIONS AS BEING SUBSTANTIALLY AS SHOWN. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE OF FINISHED WORK AND FOR THE SAME WORK, SHALL BE HELD RESPONSIBLE. 3. STRUCTURAL INFORMATION ON ROOF DETAILS ARE DIAGRAMMATIC ONLY. 4. CONTRACTOR TO FIELD VERIFY QUANTITY & LOCATION OF EXISTING ROOF PENETRATIONS, SIZE AND LOCATIONS OF EXHAUST FANS, MECHANICAL UNITS, VENTS STACKS AND OTHER ROOF PENETRATIONS OF ROOF MOUNTED ITEMS ARE DIAGRAMMATIC ONLY. 5. ROOF CONTRACTOR IS TO SURVEY THE ROOF DECKS TO VERIFY THAT SLOPES INDICATED ON PLANS ARE ACCURATE. NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO PERFORMING ANY ADDITIONAL ROOFING OPERATIONS. 6. ROOF DRAIN LOCATIONS ARE INDICATED DIAGRAMMATICALLY AND MUST BE VERIFIED IN FIELD. 7. SEE STRUCTURAL DRAWINGS FOR EXACT LOCATION, SIZE DIMENSION, MATERIAL AND ARRANGEMENT OF BUILDING COMPONENTS. (TYP.) 8. BLOCKING SHOWN IN DETAILS IS FOR REFERENCE. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL BLOCKING NECESSARY TO ACHIEVE THICKNESS & EXTENT TO ACHIEVE WORK.	
ROOF LAYED GAS PIPING	
1. PROVIDE PIPE SUPPORTS FOR NEW PIPING COMPATABLE WITH ROOF MEMBRANE MANUFACTURER, SPACED PER PIPE SUPPORT RECOMMENDATIONS.	

KAESTLE BOOS
associates, inc

20 Newman Avenue, Suite 2001-A, Rumford, RI 02916
Phone: 401-270-0365
Additional offices located in Connecticut and Massachusetts
Email: kba@kba-architects.com A Web: www.kba-architects.com

ISSUE DATE	
DATE	DESCRIPTION
11/12/2024	ISSUED FOR BID
REVISIONS	
DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS, AND GENERAL NOTES SEE SHEET R0.01

KEY PLAN

SCALE: AS NOTED PROJECT TRUE

SOUTHBRIDGE SENIOR CENTER KITCHEN STOVE
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: 24011.00 DRAWN BY: CR/MTK

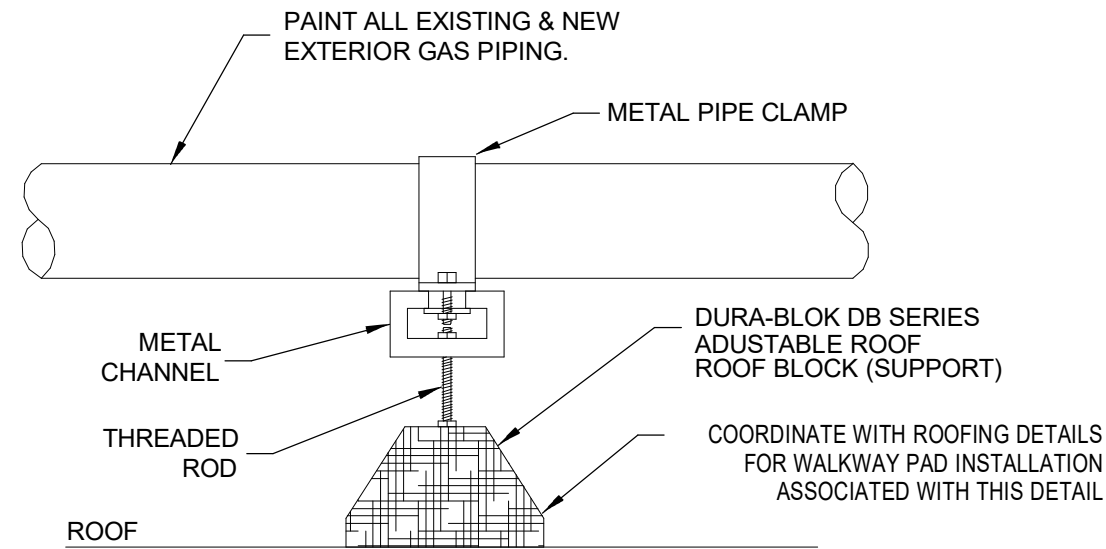
NEW CONSTRUCTION PLAN

DRAWING NO.:
A1.01

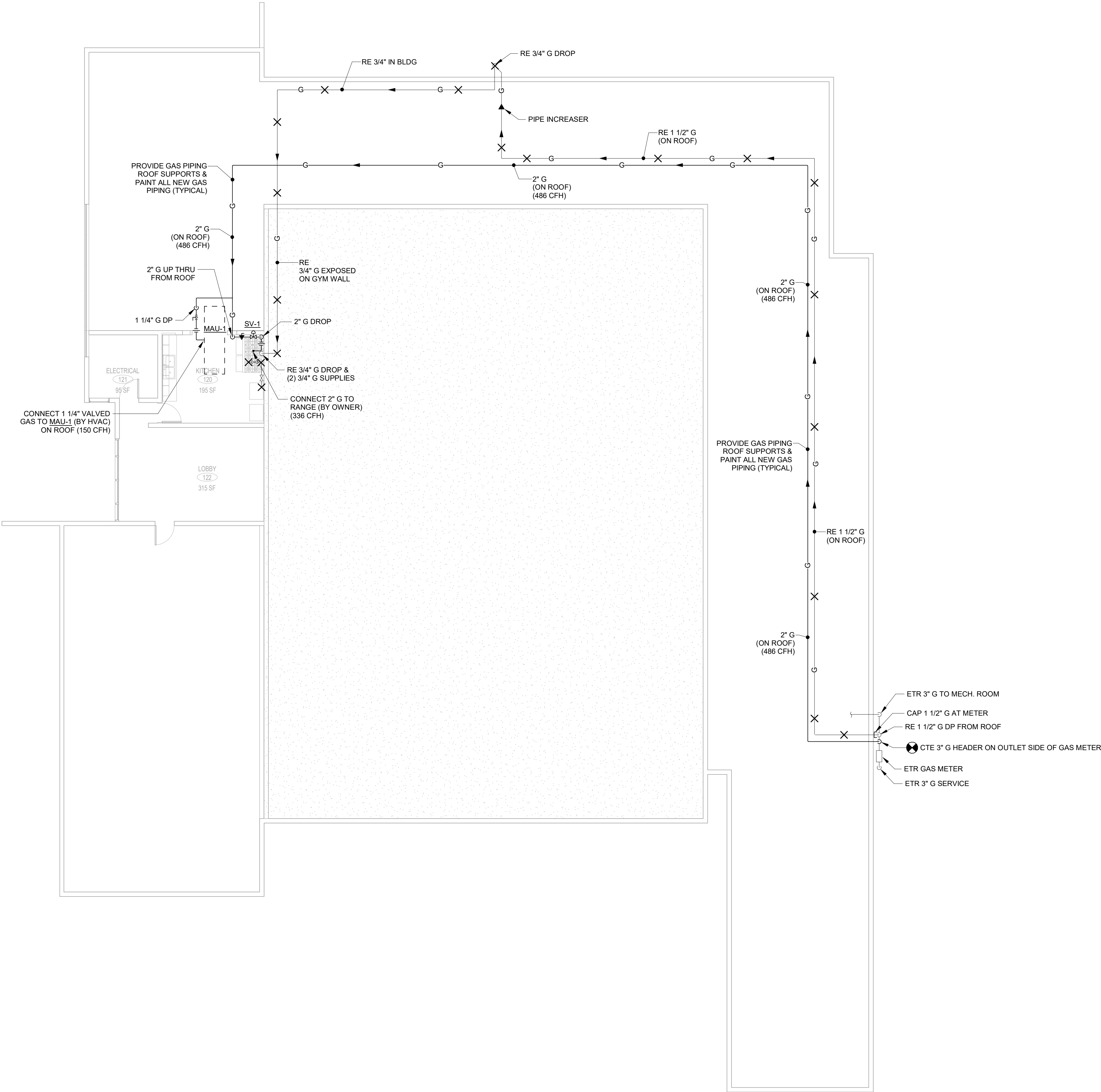
ROOF PLUMBING LEGEND		
SYMBOL	ABBREV	DESCRIPTION
	DP, DN	PIPE DROP OR DOWN
	UP	PIPE RISE OR UP
	RD	ROOF DRAIN
	VTR	VENT THRU ROOF
	AVTR	ACID VENT THRU ROOF
	RTU	ROOF TOP UNIT
	NEW	NEW WORK (DARK)
	EX	EXISTING WORK (LIGHT)
	G	GAS PIPING
	KN	PLUMBING KEY NOTE
	CTE	CONNECT TO EXISTING
	ORD	OVERFLOW ROOF DRAIN
	EX	EXISTING
	TYP	TYPICAL
	RE	REMOVE EXISTING
	CI	CAST IRON
	F&I	FURNISH AND INSTALL
	PC	PLUMBING CONTRACTOR
	GC	GENERAL CONTRACTOR
	HVAC	HEAT, VENT & AIR COND. CONTRACTOR
	STK	STACK
	STP	STANDPIPE
	EXP	EXPOSED

NOTE: NOT ALL SYMBOLS APPLY TO THIS PROJECT

PLUMBING ELECTRICAL EQUIPMENT							
UNIT NO.	UNIT FUNCTION	UNIT LOCATION (FLOOR, PART)	MOTOR				REMARKS
			HP	V	PH	KW	
SV-1	GAS SOLENOID VALVE	KITCHEN 120	-	120	1	-	



2
P1.00 / N.T.S. **DETAIL OF ROOF PIPE SUPPORT**



1
P1.00 **Main Level Overall Plan - Gas Piping**
1/8" = 1'-0"



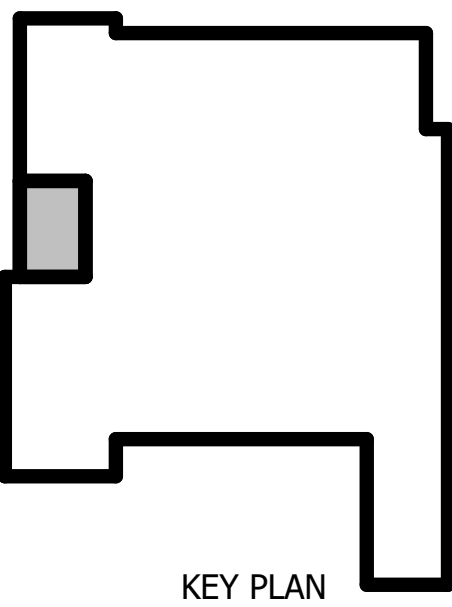
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	BID DOCUMENTS

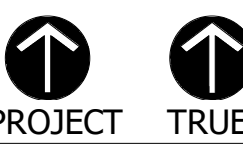
REVISIONS

DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



SCALE: 1/8" = 1'-0"



PROJECT TRUE



**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: ##### DRAWN BY: RCD

**Gas Piping Plan -
Plumbing**

DRAWING NO.:
P1.00



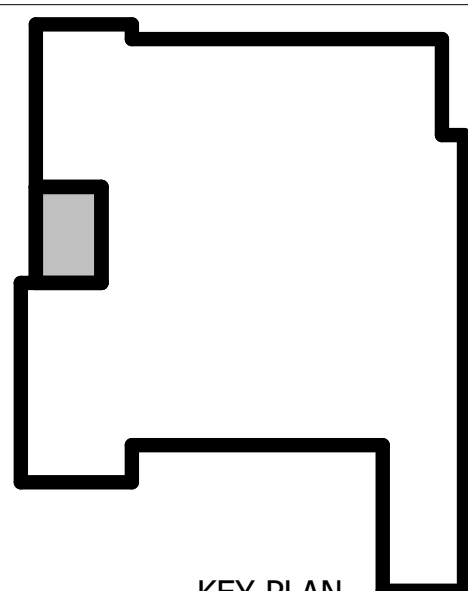
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	DRAWINGS ISSUED FOR BID

REVISIONS

DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

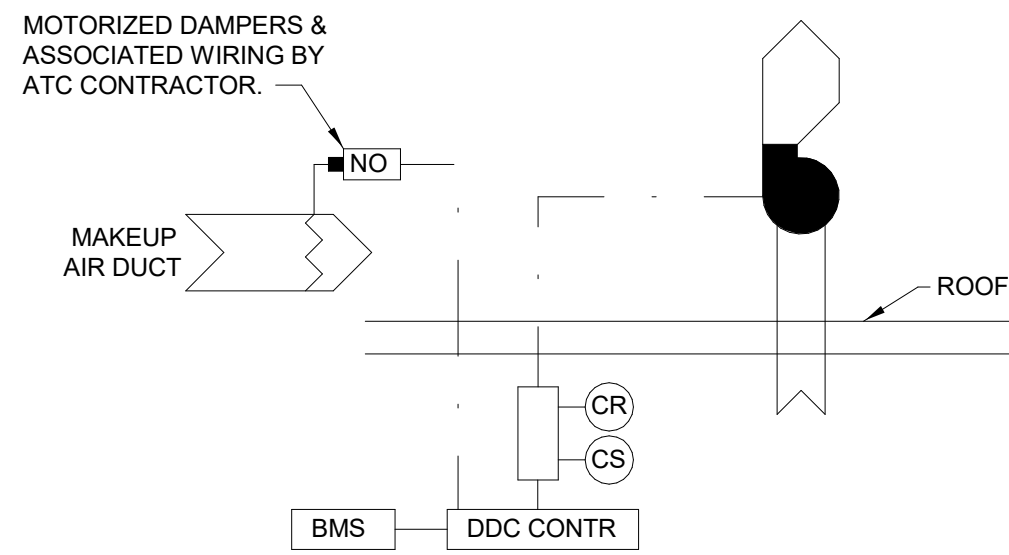
PROJECT NO.: #####.## DRAWN BY: RK

**HVAC LEGEND,
SCHEDULES,
CONTROLS**

DRAWING NO.:
M0.01

HVAC LEGEND

SYMBOL	ABBREV	DESCRIPTION
	DIA	DIAMETER
		FLOW IN DIRECTION OF ARROW
		SUPPLY AIR DUCT SECTION
		RETURN/EXHAUST AIR DUCT SECTION
		SUPPLY AIR
		RETURN/EXHAUST AIR
		EQUIPMENT TYPE
		EQUIPMENT NUMBER
		CONNECT NEW TO EXISTING
		DISCONNECT FROM EXISTING: LIMIT OF DEMOLITION
	TYP.	TYPICAL
	RH	ROOF HOOD
	MAU	MAKE-UP AIR UNIT
	EF	EXHAUST FAN
	O.A.	OUTSIDE AIR
	S.A.	SUPPLY AIR
	R.A.	RETURN AIR
	CFM	CUBIC FEET PER MINUTE
	VEL	VELOCITY
	E.A.T.	ENTERING AIR TEMPERATURE
	L.A.T.	LEAVING AIR TEMPERATURE
	E.D.B.	ENTERING DRY BULB
	E.W.B.	ENTERING WET BULB
	L.D.B.	LEAVING DRY BULB
	L.W.B.	LEAVING WET BULB
	E.W.T.	ENTERING WATER TEMPERATURE
	L.W.T.	LEAVING WATER TEMPERATURE
	T.S.P.	TOTAL STATIC PRESSURE
	E.S.P.	EXTERNAL STATIC PRESSURE
	T.D.H.	TOTAL DYNAMIC HEAD
	P.D.	PRESSURE DROP
	HP	HORSEPOWER
	V	VOLTS
	PH	PHASE
	MANUF	MANUFACTURER
	NTS	NOT TO SCALE
	HVAC	HEATING, VENTILATING AND AIR COND.
	A.T.C.	AUTOMATIC TEMP. CONTROL
	G.C.	GENERAL CONTRACTOR
	P.C.	PLUMBING CONTRACTOR
	VTR	VENT THRU ROOF
	L.R.	LONG RADIUS
	R.D.	ROOF DRAIN
	RV	ROOF VENT



EXHAUST FAN - TYPE CONTROLS

EXHAUST FAN CONTROL:

REFER TO DRAWINGS AND SCHEDULES FOR TYPE OF CONTROL REQUIRED FOR EACH FAN. ALL MOTOR OPERATED DAMPERS SHALL BE PROVIDED AND WIRED BY THIS CONTRACTOR TO OPERATE AS SEQUENCED BELOW. THESE DAMPERS SHALL ALSO BE PROVIDED WITH END SWITCHES TO CONFIRM DAMPER POSITION. UPON RECEIVING A SIGNAL THE DAMPER WILL OPEN. ONCE THE END SWITCH MAKES CONTACT THE FAN WILL START. (TYPICAL FOR ALL FANS WITH MOTORIZED DAMPERS.) ATC CONTRACTOR SHALL REFER TO EXHAUST FAN SCHEDULE FOR ALL DIRECT DRIVE FANS WITH ECM/VFD (GREENHECK VARI-GREEN OR EQUAL) MOTORS. ATC CONTRACTOR SHALL PROVIDE SPEED CONTROL SIGNAL POINT (0-10V - COORDINATED W/ MFGR) AND ASSOCIATED WIRING FROM FAN TO BMS SYSTEM.

- TYPE I: KITCHEN HOOD EXHAUST FAN ENERGIZED FROM KITCHEN EXHAUST/MAU CONTROLLER LOCATED IN KITCHEN. HOOD/EXHAUST FAN SHALL ALSO BE ENERGIZED BASED ON HEAT DETECTOR INSTALLED IN THE HOOD.

EXHAUST FANS	AI	AO	DI	DO	ALARM	SHOW ON GRAPHIC	REMARKS
FAN STATUS			X		X	X	ALL TYPES
FAN START/STOP				X		X	ALL TYPES
ECM/VFD SPEED	X	X			X	X	ALL TYPES
ISOLATION DAMPER			X	X	X	X	ALL TYPES
COIN2 VALUES	X				X	X	TYPE IV ONLY
SWITCH			X			X	TYPE III
TEMPERATURE SENSOR	X	X				X	TYPE II ONLY
MOTORIZED DAMPER	X	X			X	X	TYPE III, IV & V

MAKE UP AIR UNIT

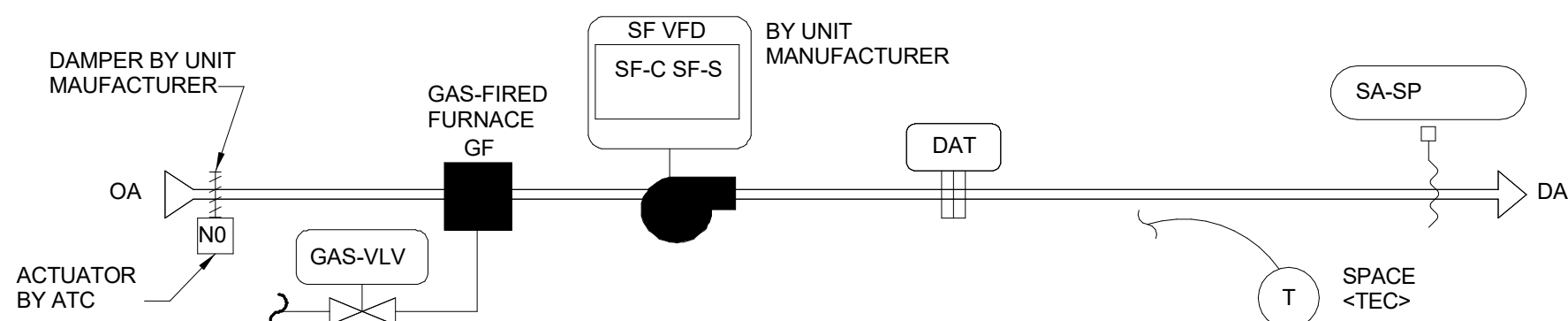
UNIT NO.	MANUF. NO.	BUILDING LOCATION	AREA SERVED	TOTAL CFM	O.A. CFM	EXT. IN W.G.	E.D.B.	L.D.B.	INPUT CFM	OUTPUT MBH	MIN. EFF.	GAS PRESS	MOTOR HP	V	PH	RPM	SIZE AND WEIGHT			REMARKS
																	L	W	H	LBS
MAU-1	IGX-112-H12-MF	ROOF	KITCHEN	1200	1200		5	93.7	150	121.5	81%	-	1/2	208	3	1725	137	44	39	1020

SELECTION BASED ON "GREENHECK"
EQUIPMENT TO BE INSTALLED BY HVAC CONTRACTOR
UNIT SHALL HAVE A MINIMUM GAS TURNDOWN OF 10:1
OVERALL SIZES AND WEIGHT IS LISTED IN INCHES AND WEIGHT DOES NOT INCLUDE CURB WEIGHT.
HVAC CONTRACTOR TO PROVIDE A 2" DEFLECTION CURB SIMILAR TO NOVIA, CAMBRIDGE PORT OR EQUAL FOR MAU UNIT.
PROVIDE UNIT WITH MIN. MERV 13 FILTERS

EXHAUST FANS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	DRIVE TYPE	SP	CFM	SONES	MOTOR			CONTROL		REMARKS
							HP	V	PH	TYPE	SYST.	
KEF-1	CUE-140-VG	ROOF	DIRECT	1.5	1,100	9.1	1	208	3	KITCHEN HOOD	--	

SELECTIONS BASED ON "CAPTIVE AIRE"
EQUIPMENT TO BE INSTALLED BY HVAC CONTRACTOR
FAN SHALL BE UL-762 APPROVED FOR COOKING HOOD APPLICATIONS AND PROVIDED WITH FEATURES SUCH AS GREASE TRAP, VENTED EXTENSION AND HINGED BASE KIT. REFER TO DETAILS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.



MAIN KITCHEN HOOD VENTILATION CONTROL - MAU-1 (KITCHEN)

THROUGH THE "PUSH-TO-START" CONTROL PROVIDED ON THE KITCHEN HOOD OR THROUGH THE BUILDING EMS SYSTEM, THE EXHAUST FANS (KEF-1) SHALL START ALONG WITH THE ASSOCIATED MAKE UP AIR UNIT SUPPLY FAN.

WHEN THE KITCHEN HOOD IS OFF THE REVERSE SHALL OCCUR.

DURING A FIRE EMERGENCY THE "ANSUL" SYSTEM SHALL START THE EXHAUST FAN AND THE MAKE UP AIR FANS SHALL SHUT DOWN AND GAS-HEATING VALVE SHALL CLOSE.

THE GENERAL ON/OFF AND OCCUPIED/UNOCCUPIED CONTROL OF SUPPLY AND EXHAUST FANS FOR THE KITCHEN HOOD SHALL BE CONTROLLED BY THE KITCHEN EMS SYSTEM.

OCCUPIED

SUPPLY FAN SHALL START AND OA DAMPER SHALL OPEN TO ITS PRESET POSITION UPON A CALL FOR HEATING. GAS FIRED FURNACE VALVE SHALL MODULATE TO MAINTAIN SPACE TEMP. SETPOINT (85° ADJ.)

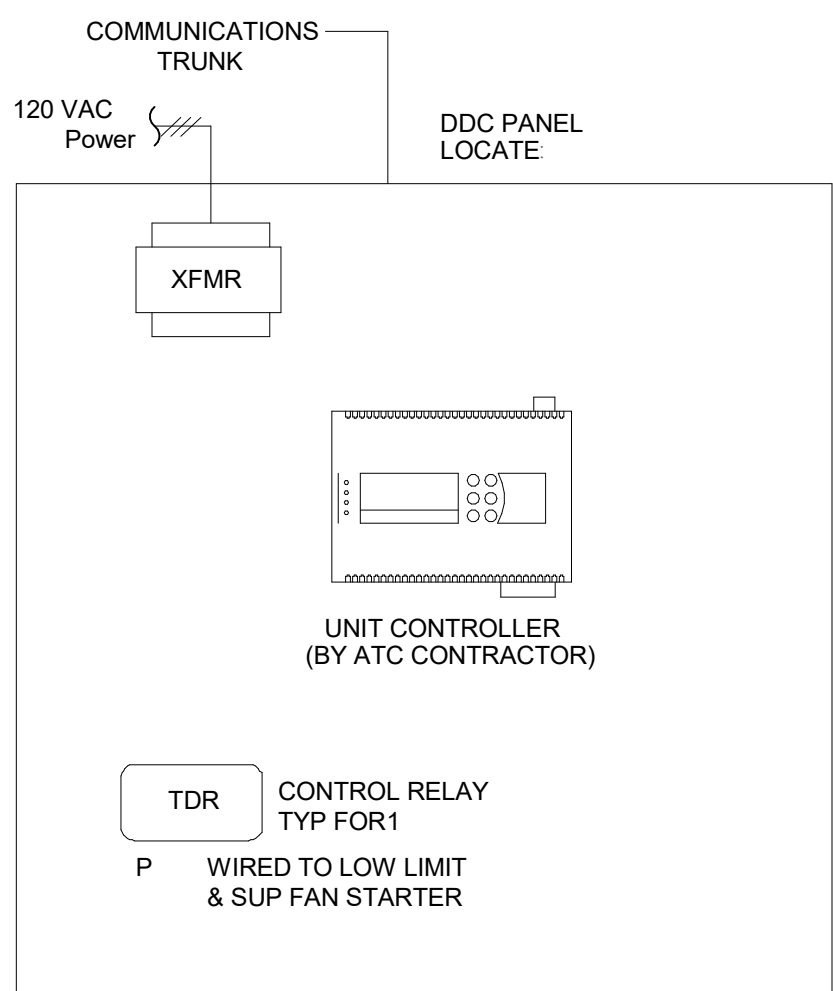
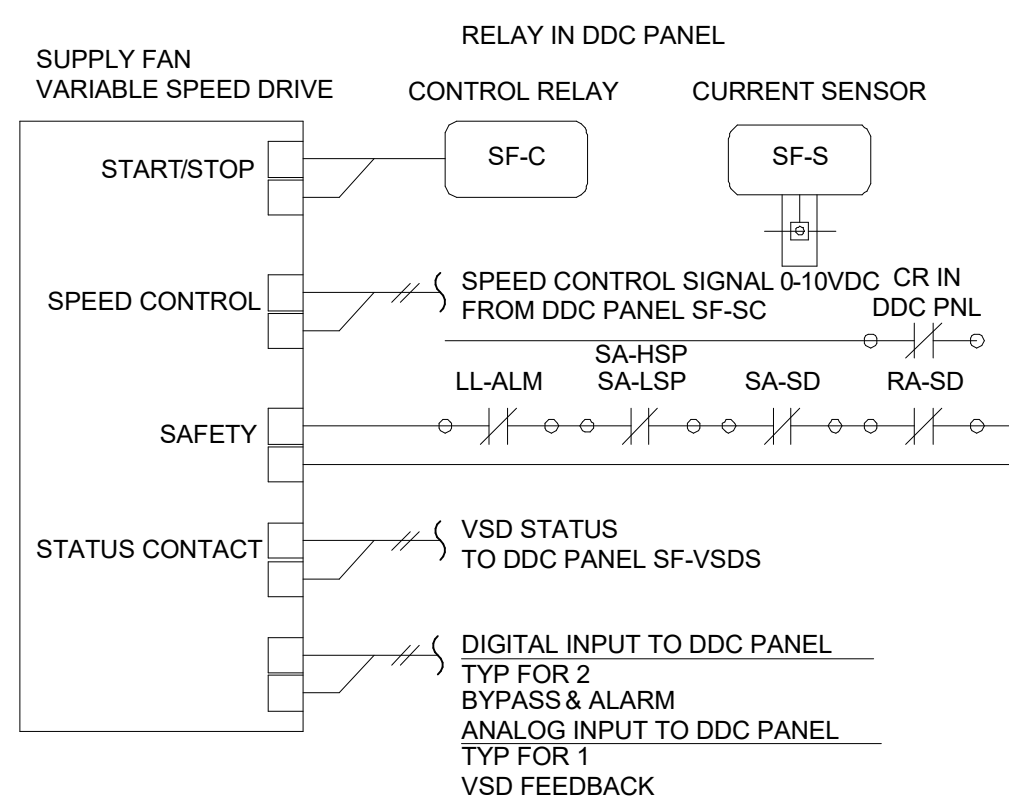
UNOCCUPIED

KITCHEN EXHAUST FAN, DISHWASHER EXHAUST FAN AND MAKE-UP AIR UNIT SHALL BE OFF. MUA UNIT OUTSIDE AIR DAMPER SHALL BE CLOSED.

ATC CONTRACTOR SHALL PROVIDE THE FOLLOWING POINTS FOR MONITORING AND CONTROL CAPABILITY. A FRONT END CONTROL SYSTEM SHALL PROVIDE ALL CONTROLS, SENSORS, ACTIVATORS, AND WIRING REQUIRED TO MEET THE ABOVE SEQUENCE AND THE KITCHEN EQUIPMENT CONTRACTOR'S REQUIREMENTS INCLUDING INSTALLING KITCHEN EQUIPMENT CONTRACTOR FURNISHED CONTROL DEVICES. COORDINATE HOOD VENTILATION CONTROL SYSTEM REQUIREMENTS WITH KITCHEN EQUIPMENT CONTRACTOR.

MAKE UP AIR UNIT (MAU-1)	AI	AO	DI	DO	ALARM	REMARKS
SUPPLY FAN S/S & STATUS		X	X	X	X	VIA VFD
SUPPLY FAN VFD			X	X		
OA DAMPER POSITION	X	X			X	W/ POS. FEEDBACK
FILTER STATUS			X			
SUPPLY S.P.	X	X				
DISCHARGE AIR TEMP.	X					
AIRFLOW CFM (S.A.)	X	X				
GAS FURNACE MODULATING VALVE			X	X	X	
OUTSIDE AIR TEMP.	X					FROM CENTRAL DDC POINT
OUTSIDE AIR % RH	X					FROM CENTRAL DDC POINT
SMOKE DETECTOR(S)			X		X	

KITCHEN EXHAUST FAN	AI	AO	DI	DO	ALARM	REMARKS
EXHAUST FAN S/S & STATUS		X	X	X	X	
EXHAUST FAN VFD CONTROL			X	X		





GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

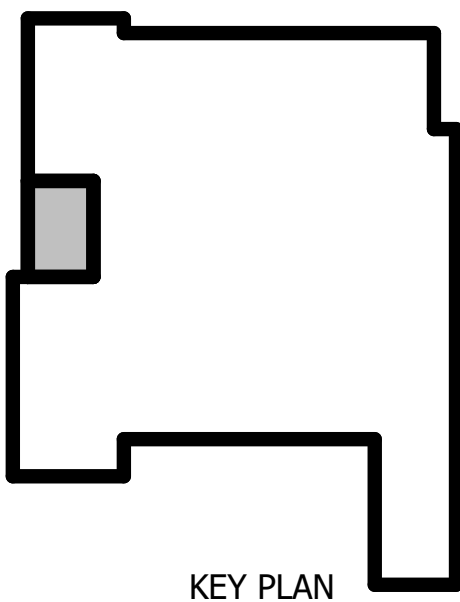
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	DRAWINGS ISSUED FOR BID

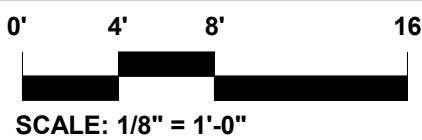
REVISIONS

DATE	DESCRIPTION

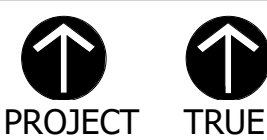
FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN



SCALE: 1/8" = 1'-0"



SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE

153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

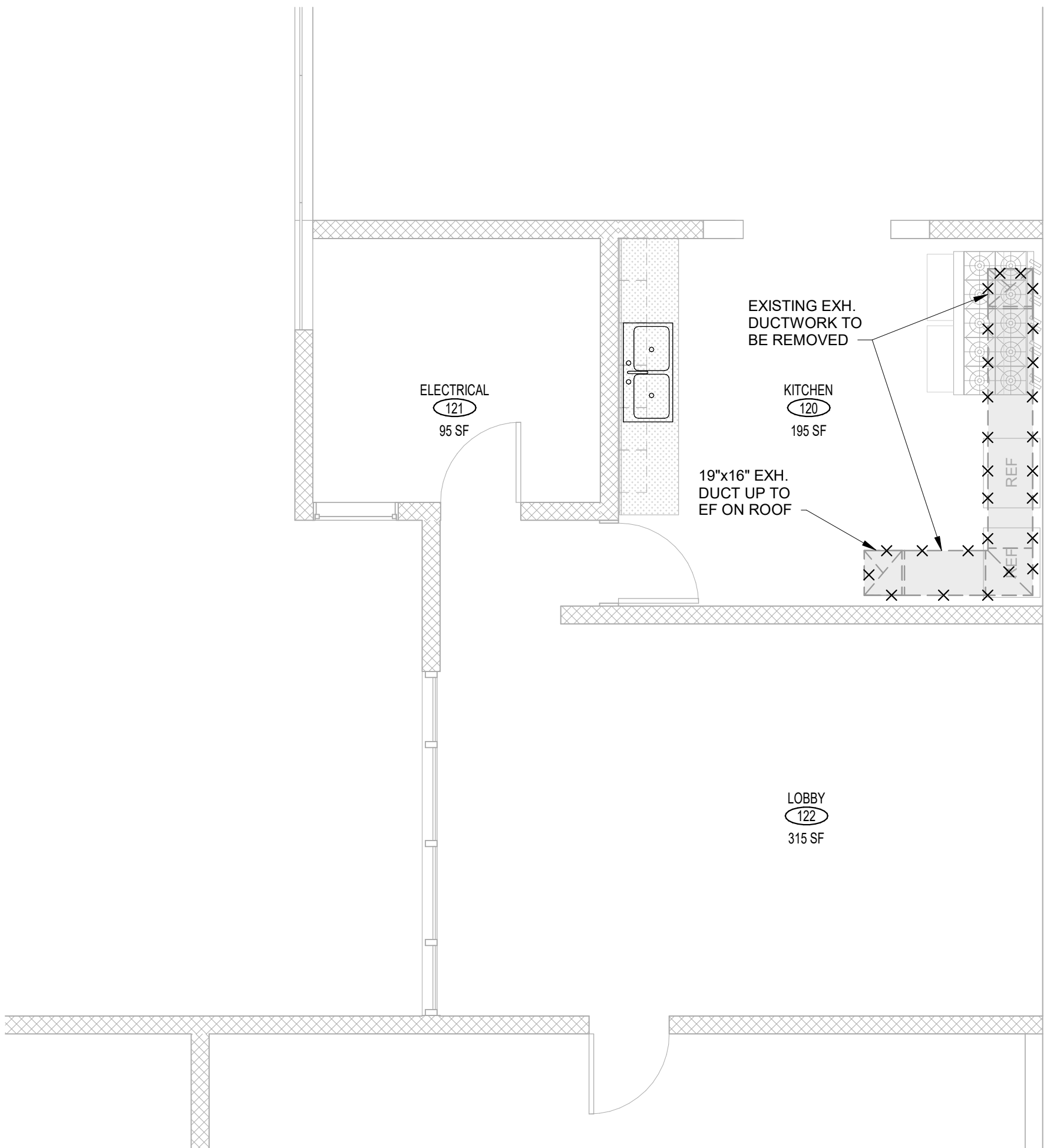
PROJECT NO.: #####.##

DRAWN BY: RK

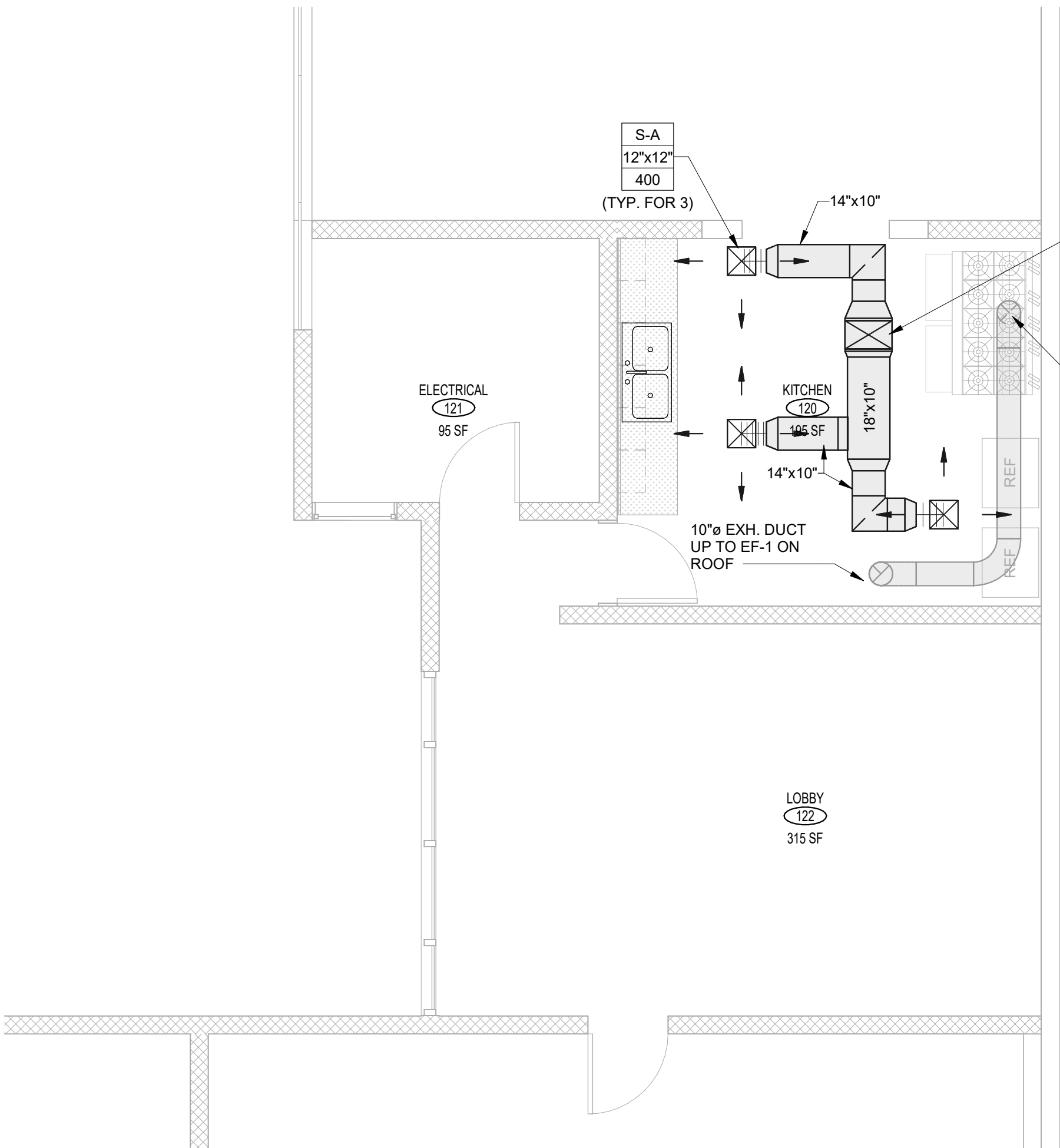
HVAC FLOOR PLAN

DRAWING NO.:

M1.01



② MAIN LEVEL PLAN DEMO
1/4" = 1'-0"



① MAIN LEVEL PLAN
1/4" = 1'-0"



GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

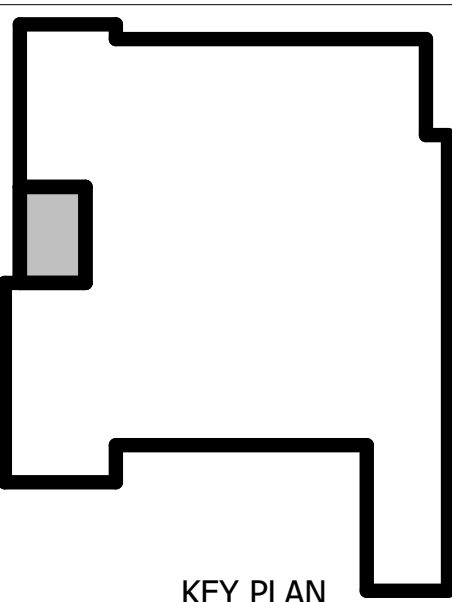
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	DRAWINGS ISSUED FOR BID

REVISIONS

DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN

0' 4' 8' 16'
SCALE: 1/8" = 1'-0"
PROJECT TRUE



**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: #####.##

DRAWN BY: Author

HVAC ROOF PLAN

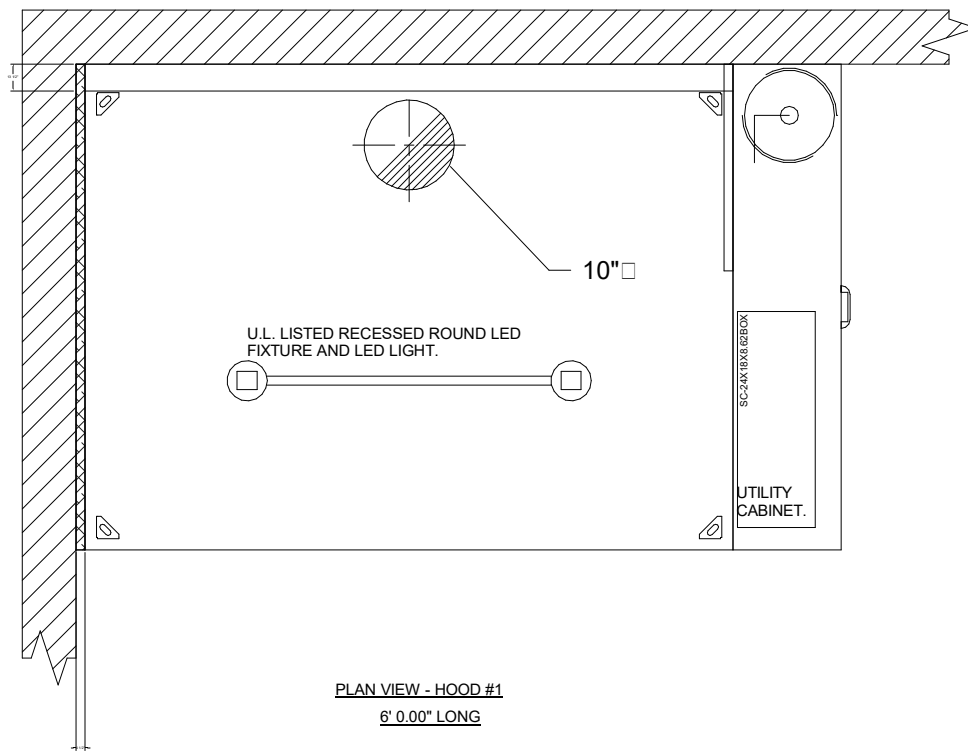
DRAWING NO.:

M1.02

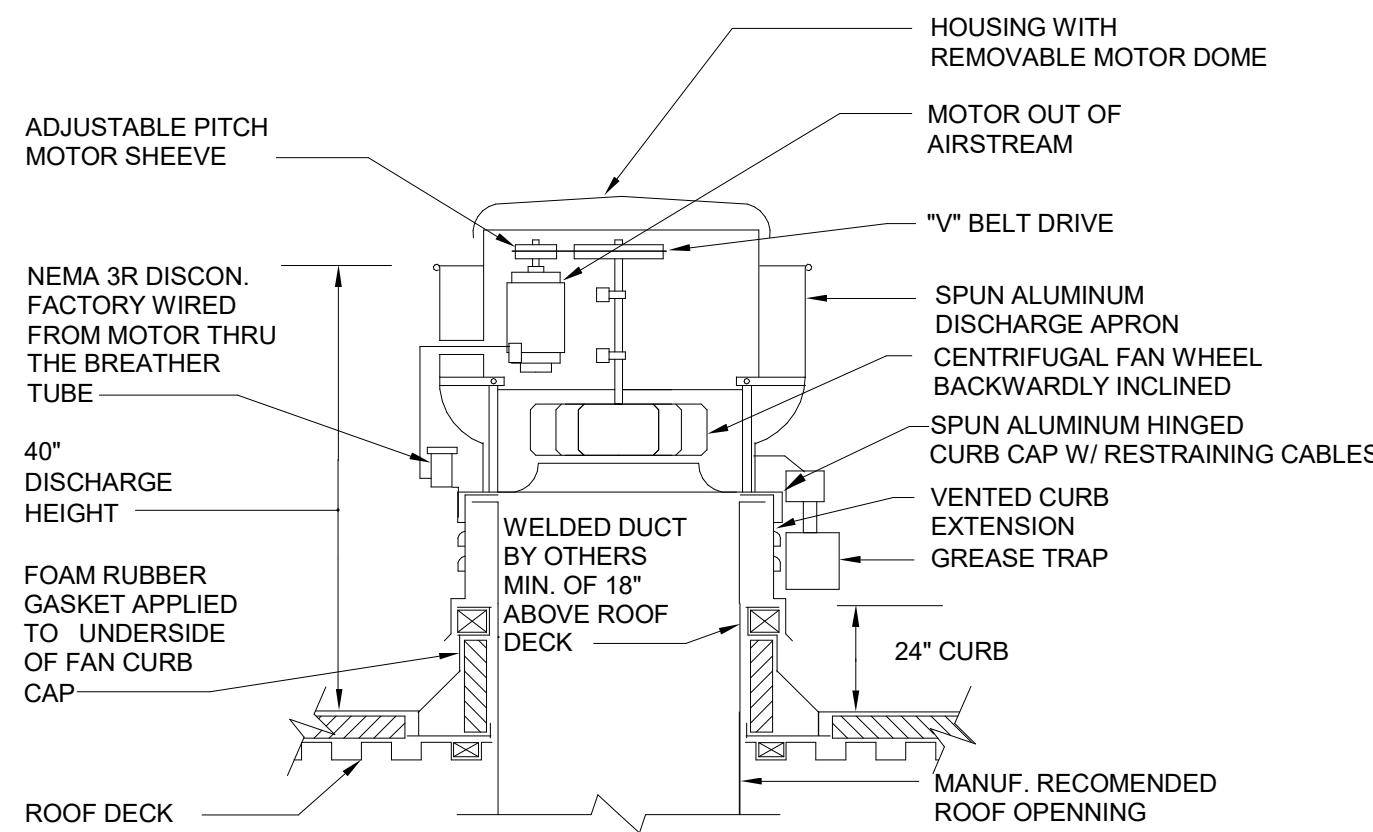
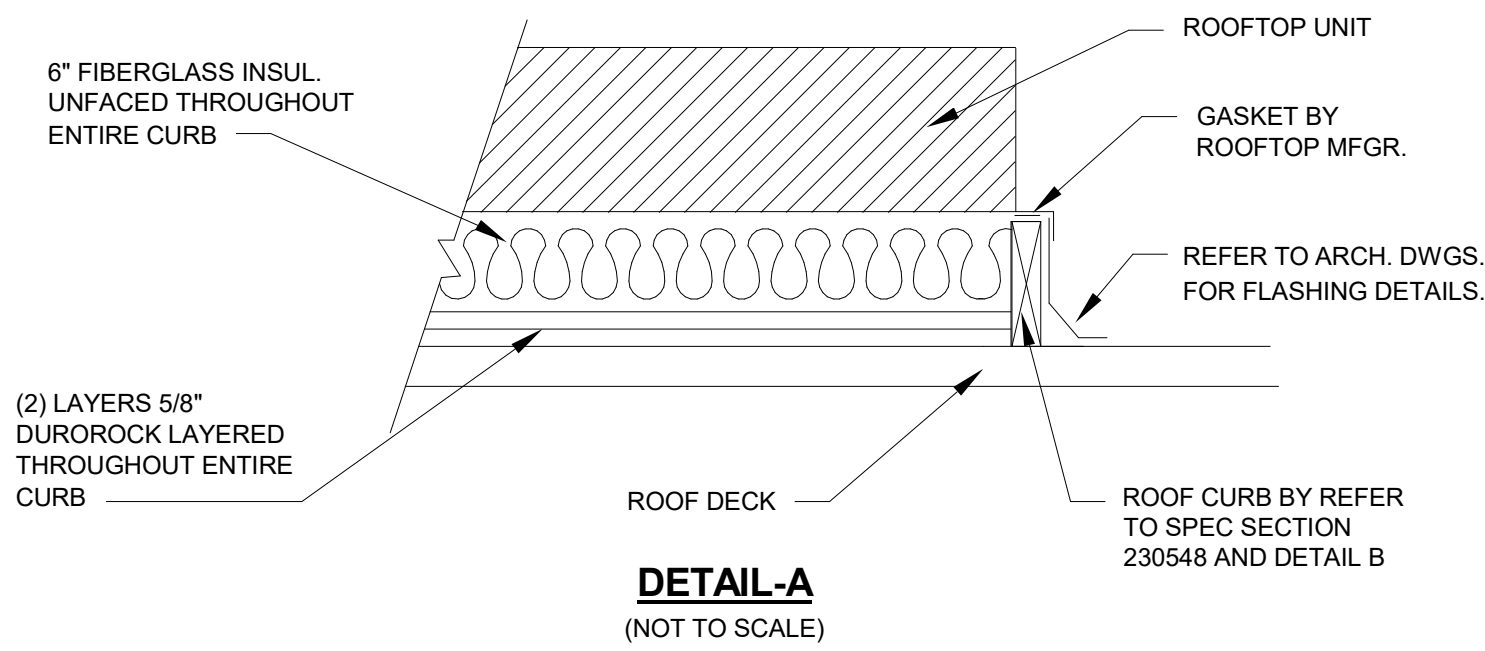
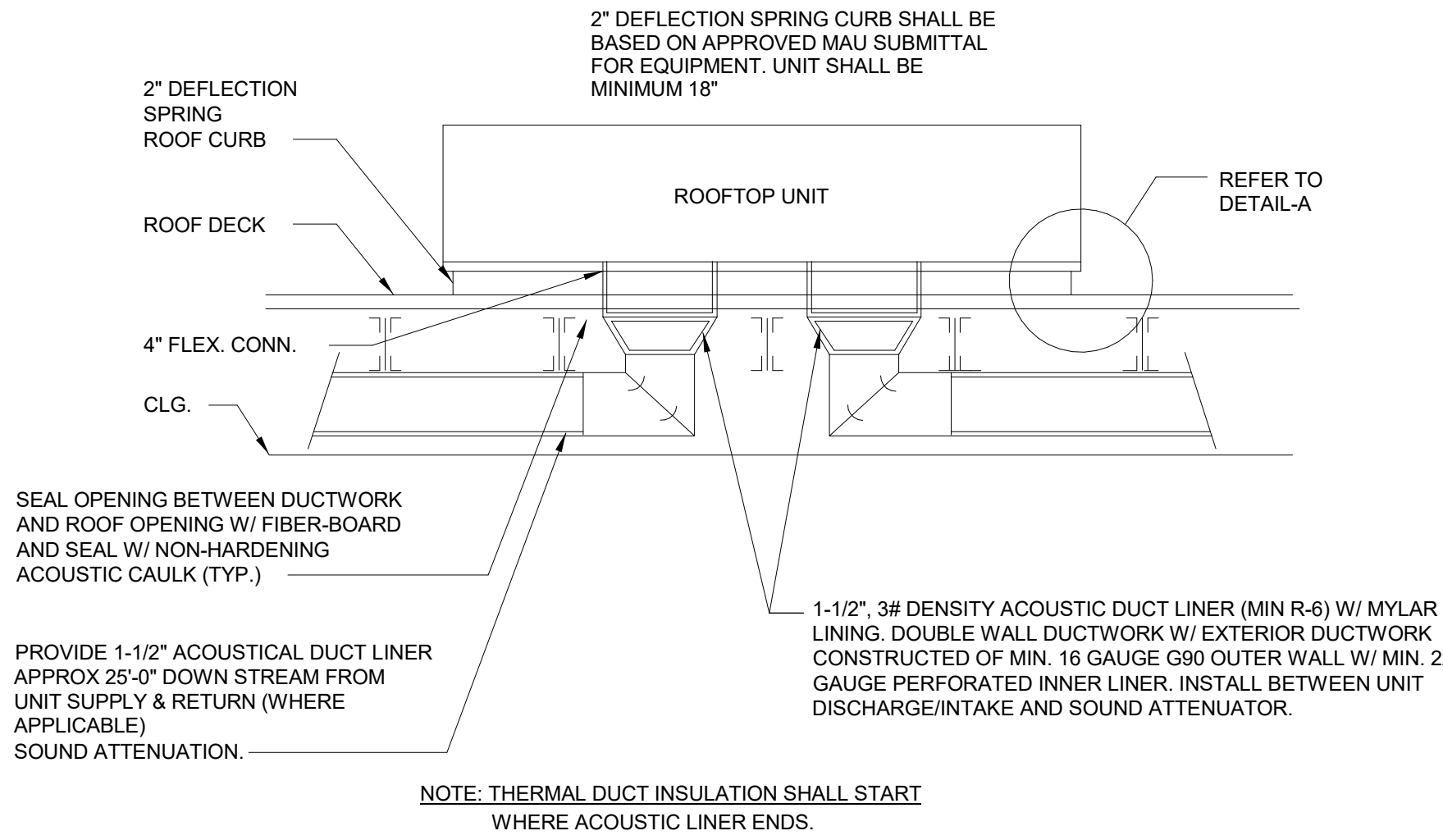
KITCHEN HOOD NOTES

- KITCHEN EXHAUST HOOD SHALL BE PROVIDED AND INSTALLED BY GENERAL CONTRACTOR.
- HOOD SELECTION INDICATED WAS USED AS REFERENCE FOR BASIS OF DESIGN EQUIPMENT. REFER TO KITCHEN HOOD SECTION OF THE PROJECT SPECIFICATIONS FOR CRITERIA AND REQUIREMENTS OF KITCHEN HOOD TO BE SUBMITTED ON BY THE GENERAL CONTRACTOR.
- HVAC CONTRACTOR SHALL BE RESPONSIBLE FOR DUCTED CONNECTIONS TO HOOD (BY OTHERS) TO EXHAUST FAN BY HVAC CONTRACTOR.
- HVAC CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING DUCTED CONNECTIONS TO FINAL KITCHEN HOOD OF APPROVED EQUIPMENT SUBMITTAL. COORDINATE WITH GC PRIOR TO RESUBMITTING.

INSTALLER MUST CONFIRM HOOD IS INSTALLED SUCH THAT THE SPECIFIED WALL, ACTING AS AN END PANEL, IS MATED TIGHT TO THE CORRECT END OF HOOD TO ACHIEVE A REDUCED MINIMUM EXHAUST CFM LISTING. NON-COMPLIANCE WILL NULLIFY THE ETL LISTING, VOID THE MANUFACTURER'S WARRANTY, AND HOLD THE CONTRACTOR LIABLE FOR ANY AND ALL LOSSES, COSTS, AND EXPENSES RELATED TO THE NON-COMFORMANCE OF THE MANUFACTURER'S SPECIFIED INSTRUCTION. THE WALL ACTING AS AN END PANEL MUST EXTEND NO LESS THAN 20" FROM THE INTERSECTING WALL ON WHICH HOOD IS MOUNTED AND MUST EXTEND NO LESS THAN 20" UNDER BOTTOM OF HOOD TO BE ELIGIBLE FOR REDUCED MINIMUM EXHAUST CFM LISTING.



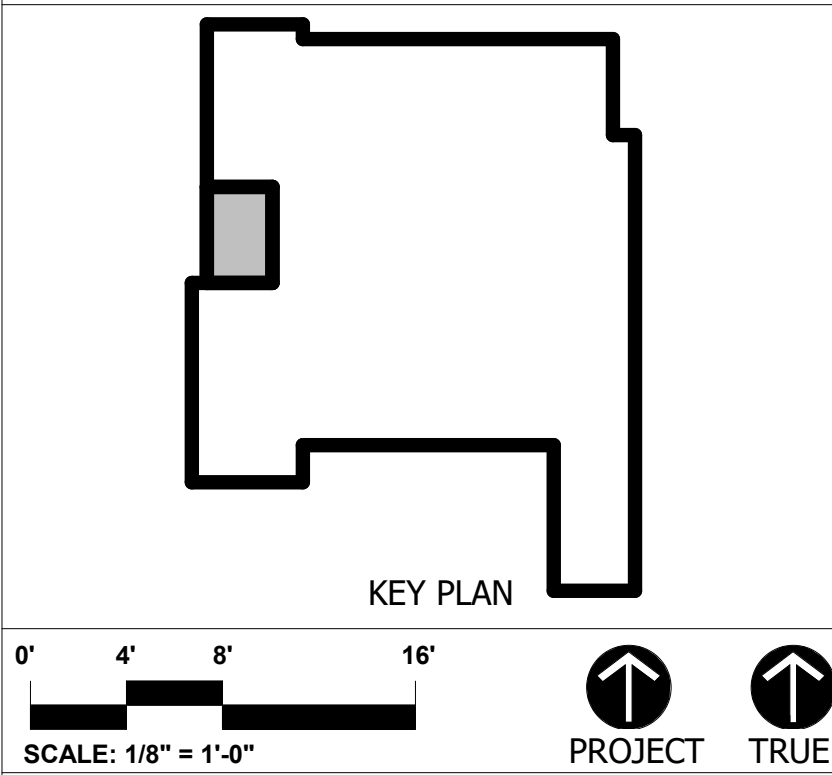
KITCHEN HOOD DETAIL FOR REFERENCE ONLY
(NOT TO SCALE)



ISSUE DATE	
DATE	DESCRIPTION
11/12/2024	DRAWINGS ISSUED FOR BID

REVISIONS	
DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: #####.## DRAWN BY: RK

HVAC DETAILS

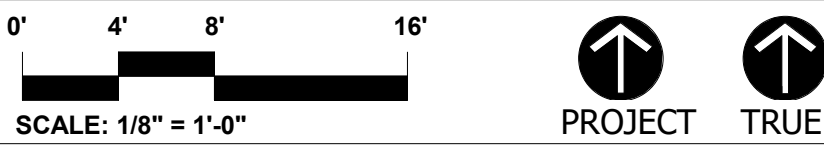
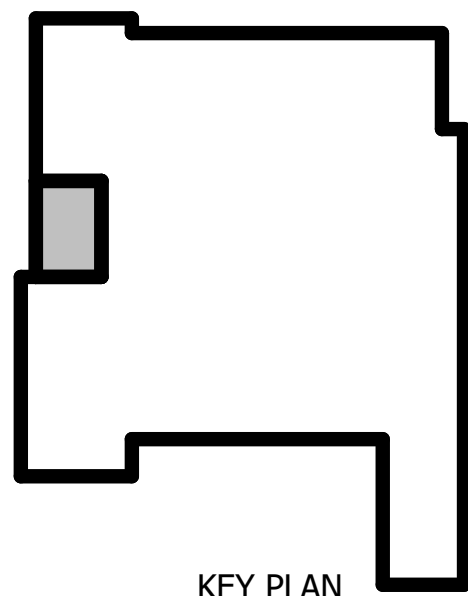


GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

ISSUE DATE	
DATE	DESCRIPTION
11/12/2024	DRAWINGS ISSUED FOR BID

REVISIONS	
DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01

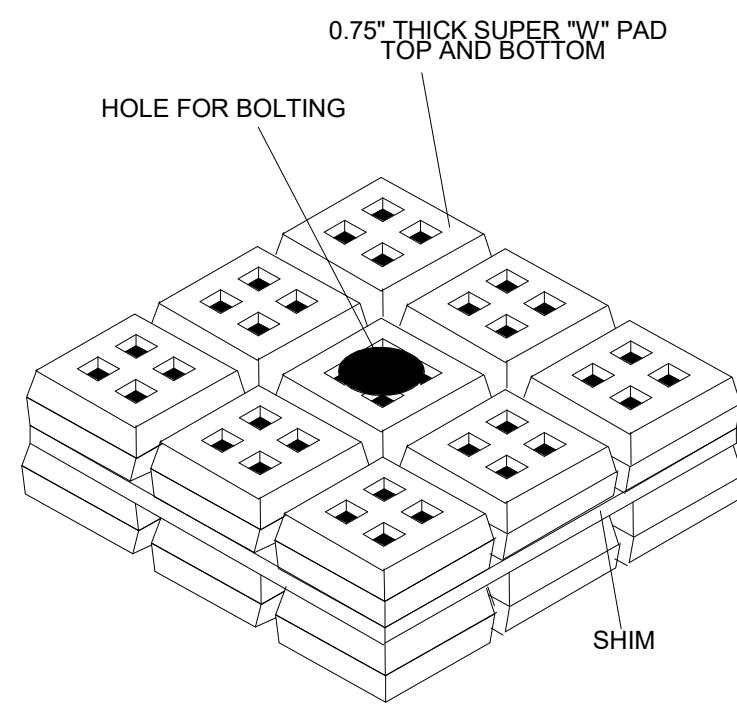


**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

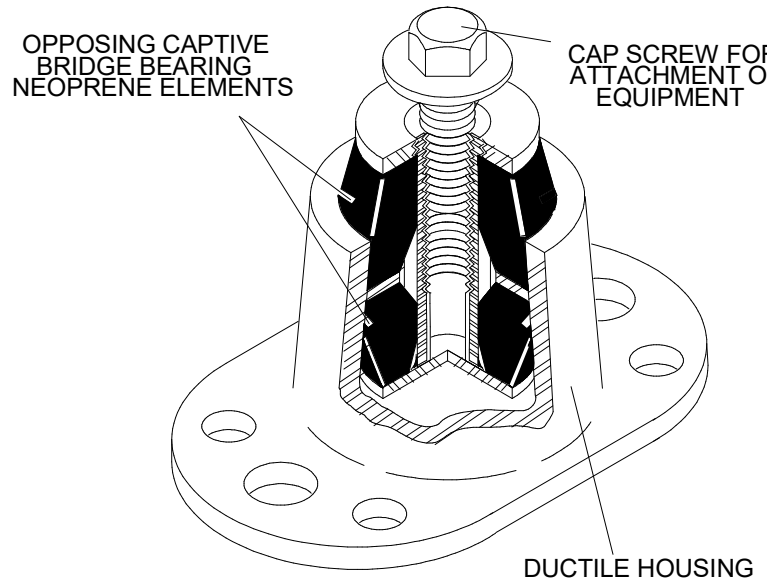
PROJECT NO.: #####.## DRAWN BY: RK

HVAC VIBRATION CONTROLS I

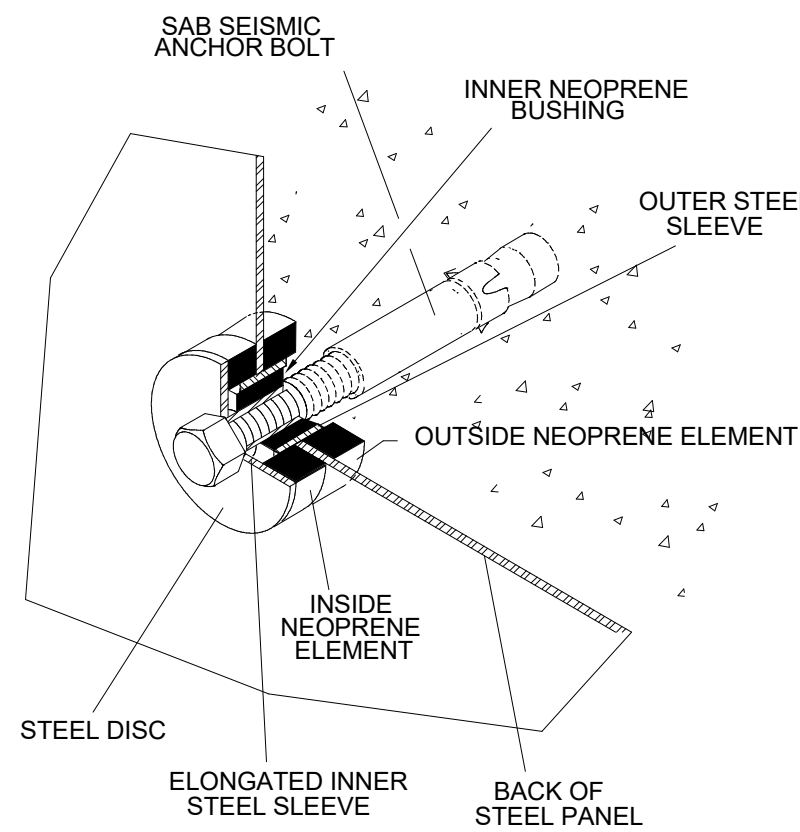
DRAWING NO.:
VC-1



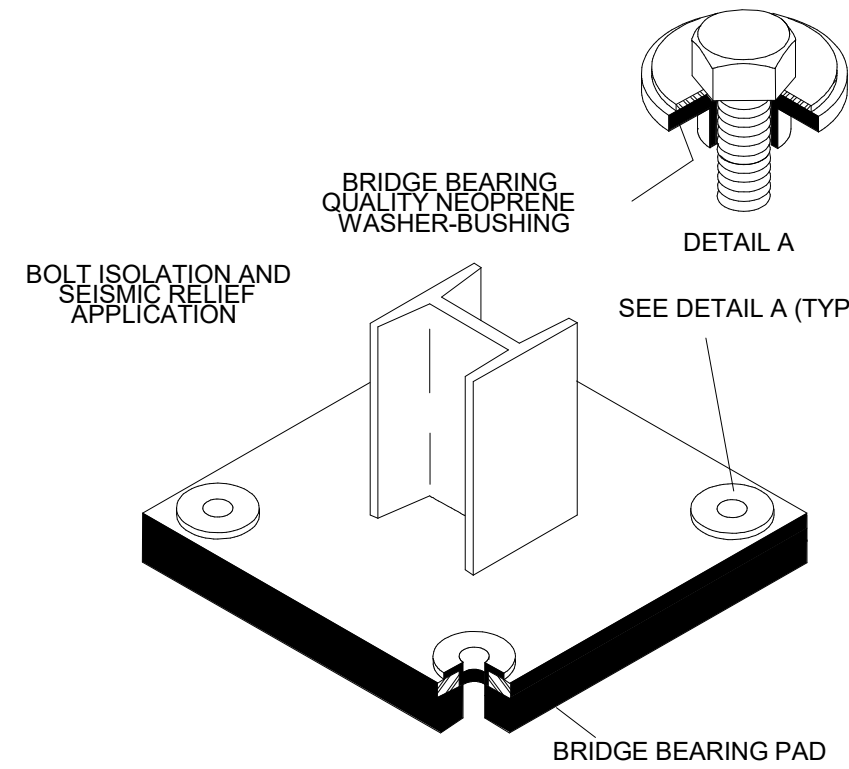
LAYERED SUPER "W" PADS
WITH STEEL SHIM
SPECIFICATION 1



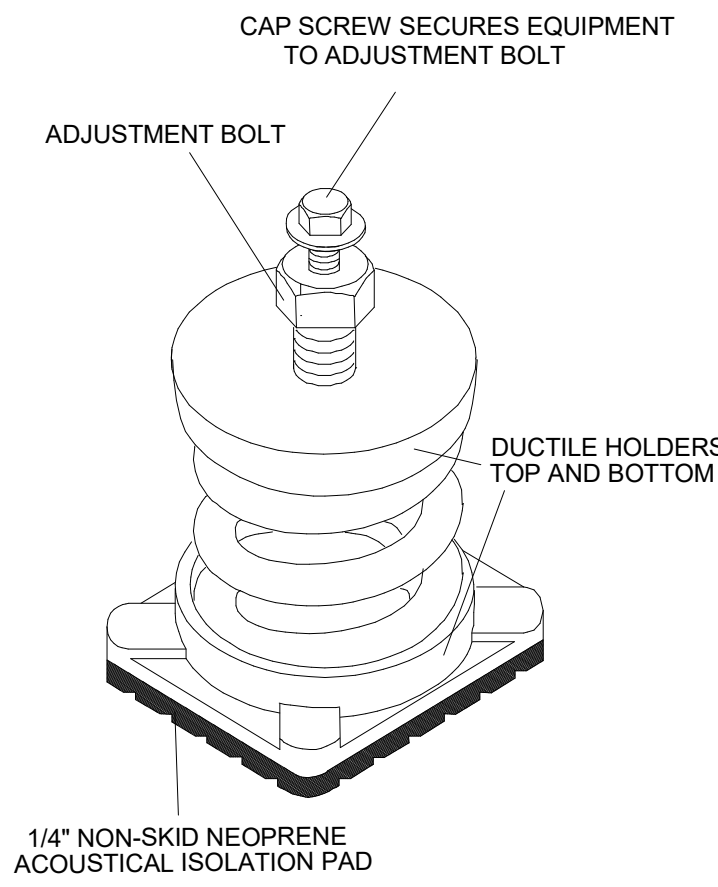
RESTRAINED BR MOUNT
SPECIFICATION 2



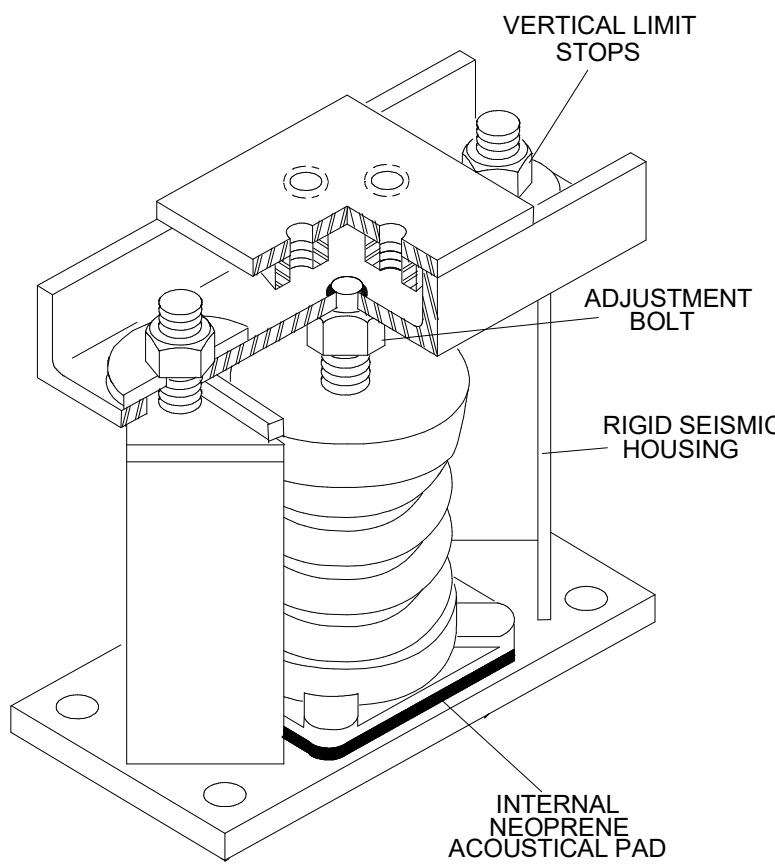
PB BUSHING
SPECIFICATION 3



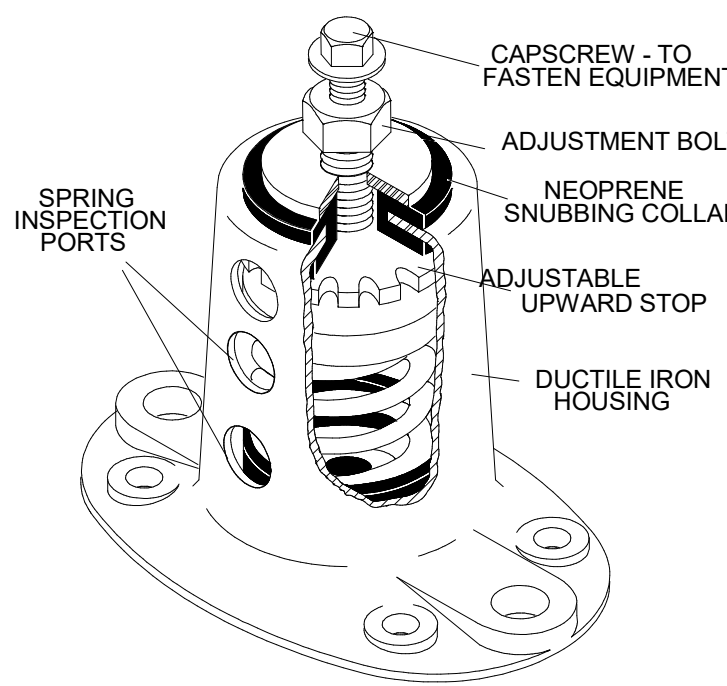
HG NEOPRENE BUSHING
SPECIFICATION 4



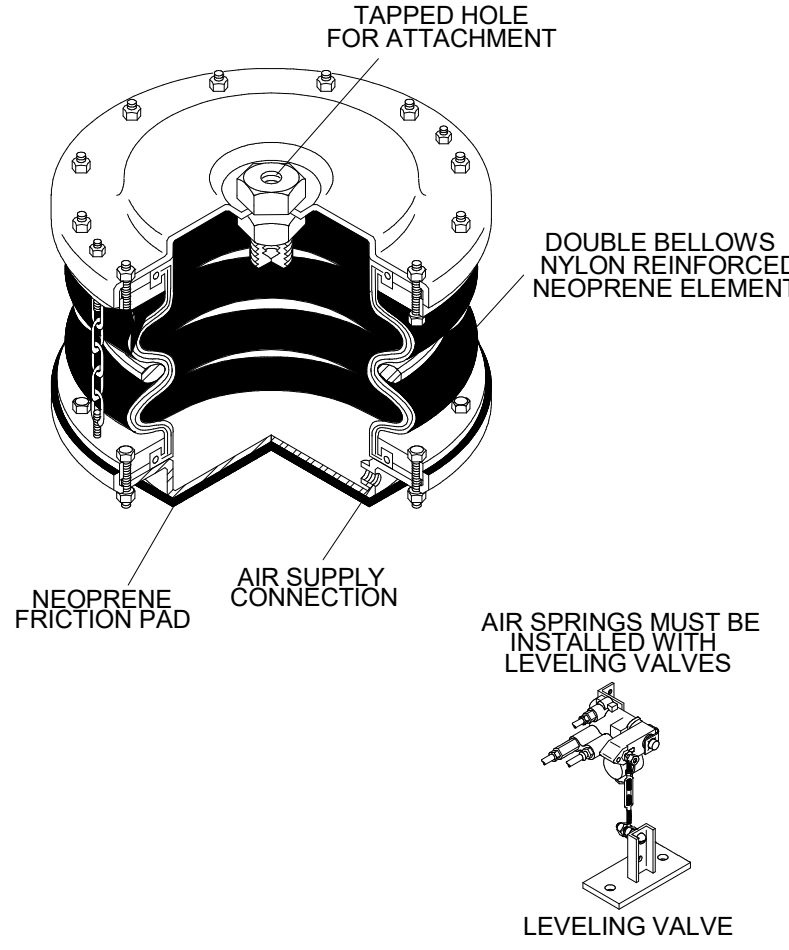
SLF SPRING MOUNT
SPECIFICATION 5



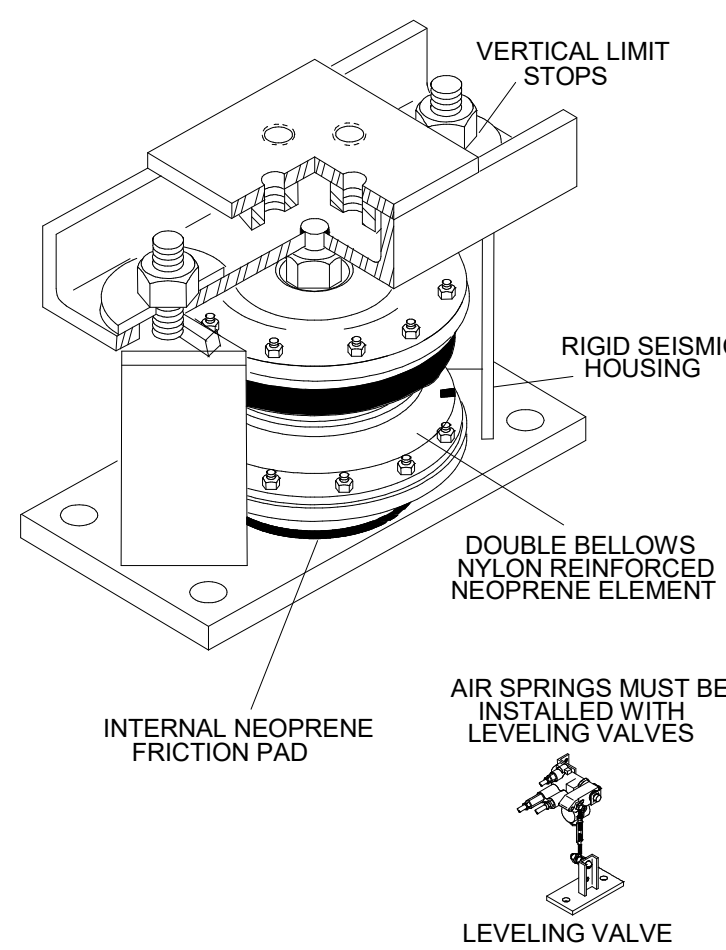
SLR SPRING MOUNT
SPECIFICATION 6



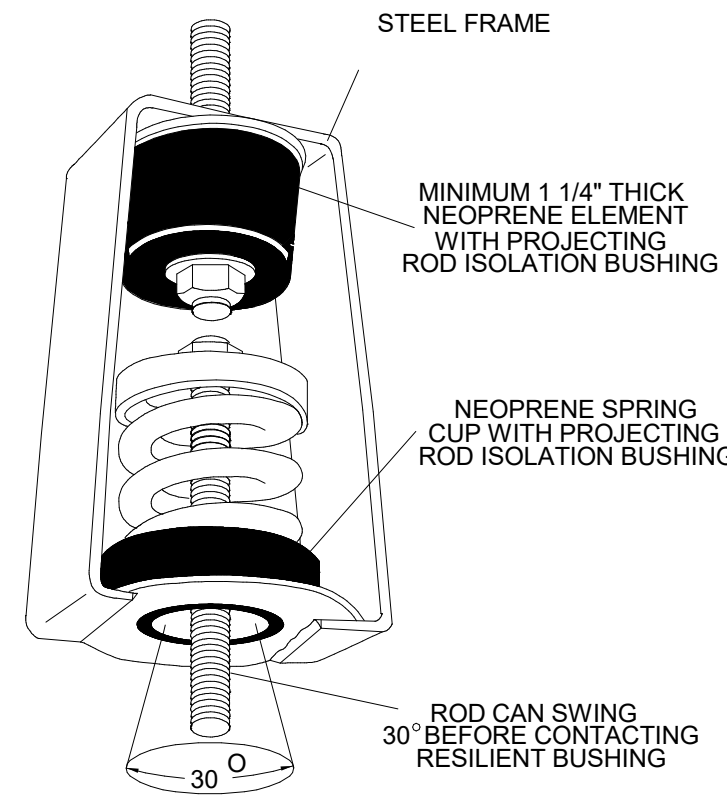
SSFH HOUSED SPRING MOUNT
SPECIFICATION 7



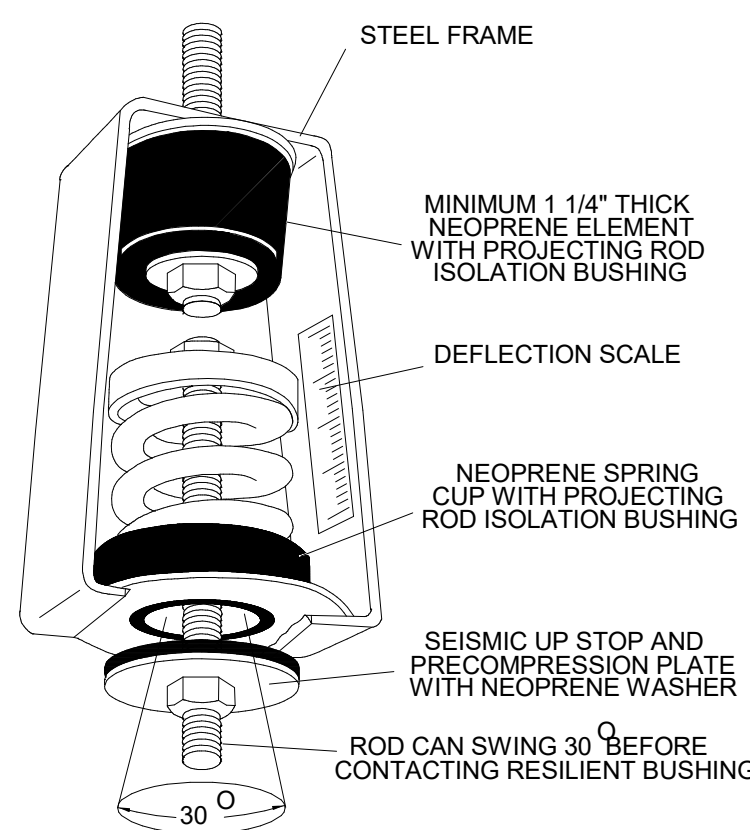
MT AIR SPRING MOUNT
SPECIFICATION 8



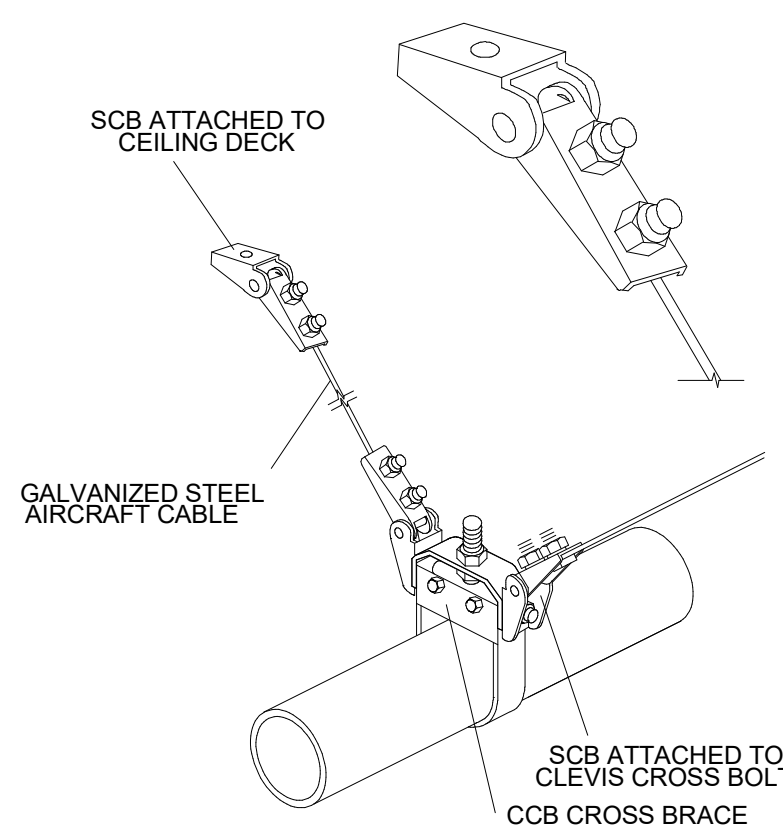
SLR AIR SPRING MOUNT
SPECIFICATION 9



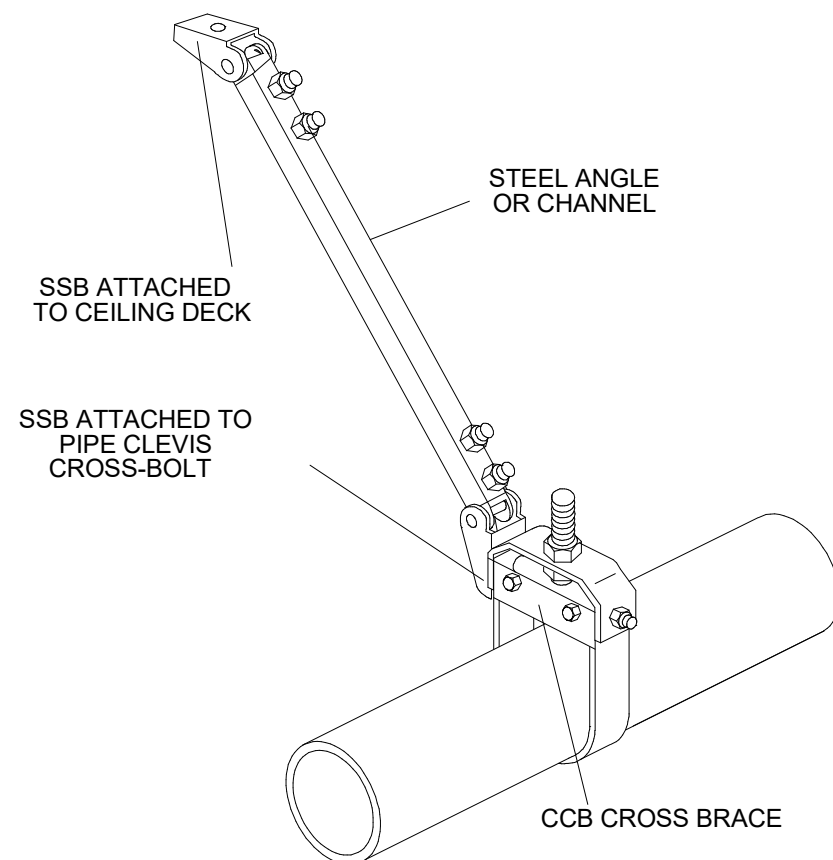
30N SPRING AND NEOPRENE HANGER
SPECIFICATION 10



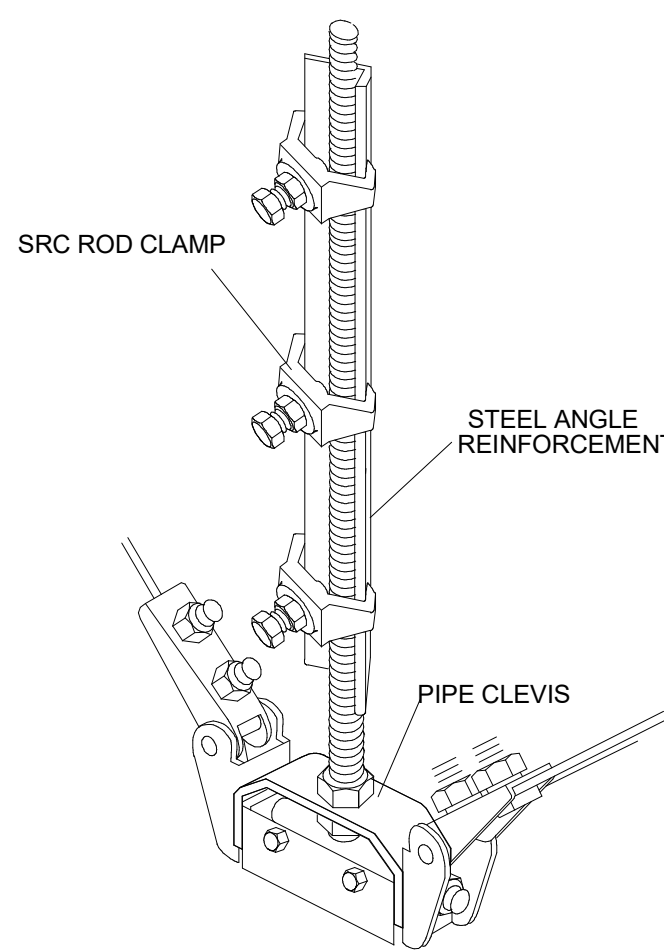
PC30N PRECOMPRESSED
SPRING AND NEOPRENE HANGER
SPECIFICATION 11



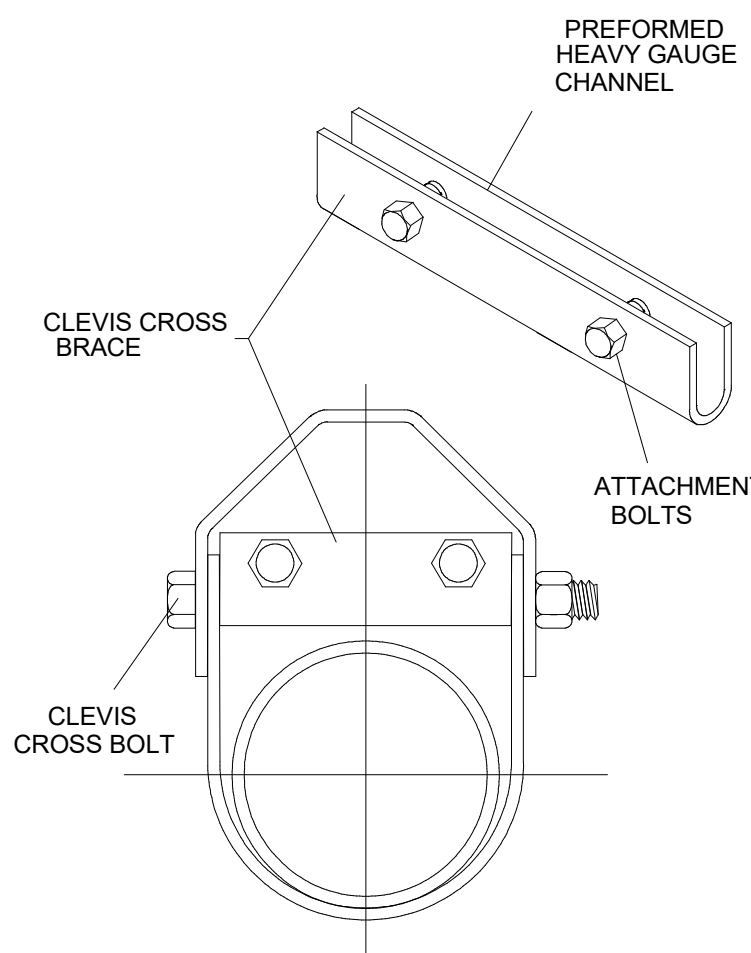
SCB, SCBH, AND SCBV CABLE RESTRAINTS
OSPD PRE-APPROVAL NO. 0202
SPECIFICATION 12



SEISMIC SOLID BRACE
SPECIFICATION 13



SRC SEISMIC ROD CLAMPS
SPECIFICATION 14



CCB CLEVIS CROSS BRACE
SPECIFICATION 15



GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@gg-d.com

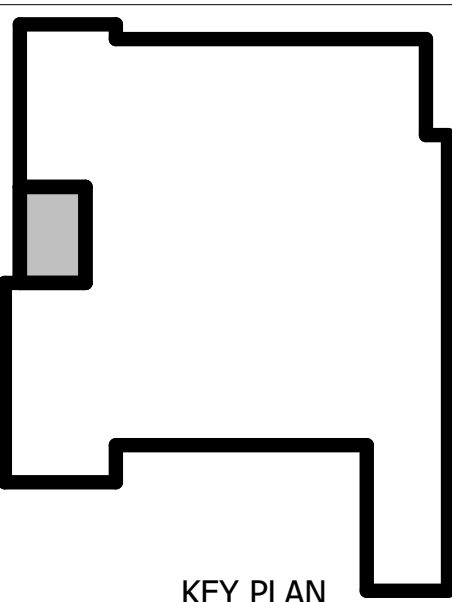
ISSUE DATE

DATE DESCRIPTION
11/12/2024 DRAWINGS ISSUED FOR BID

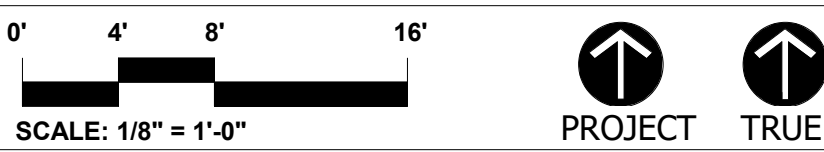
REVISIONS

DATE DESCRIPTION

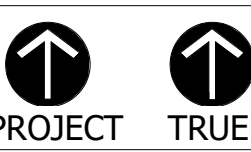
FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN



SCALE: 1/8" = 1'-0"

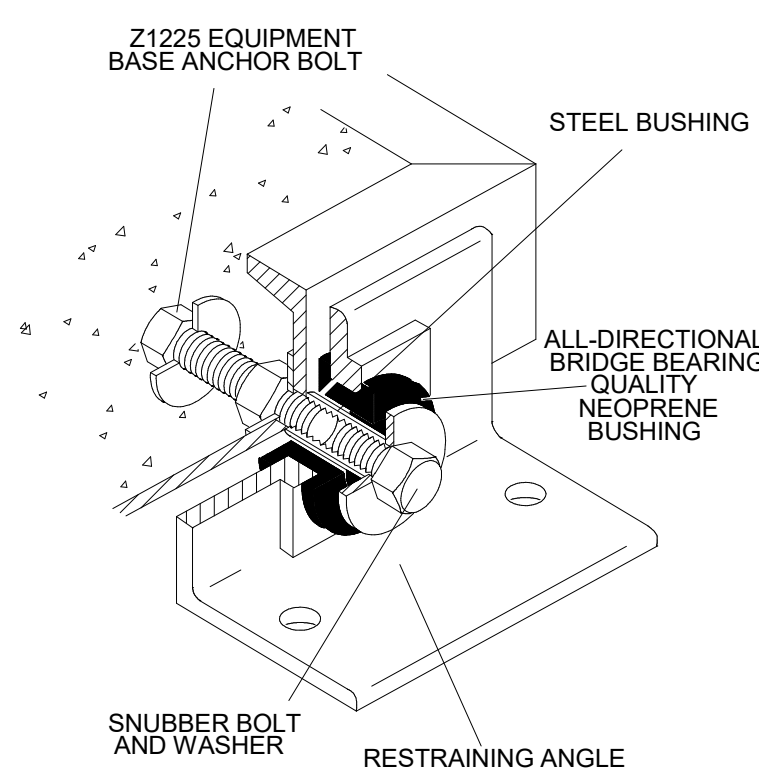


**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

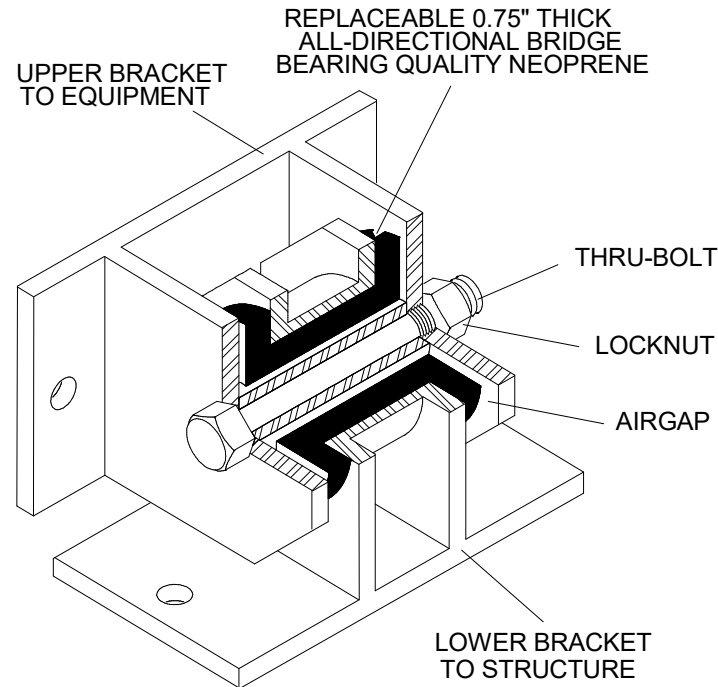
PROJECT NO.: #####.## DRAWN BY: RK

**HVAC VIBRATION
CONTROLS II**

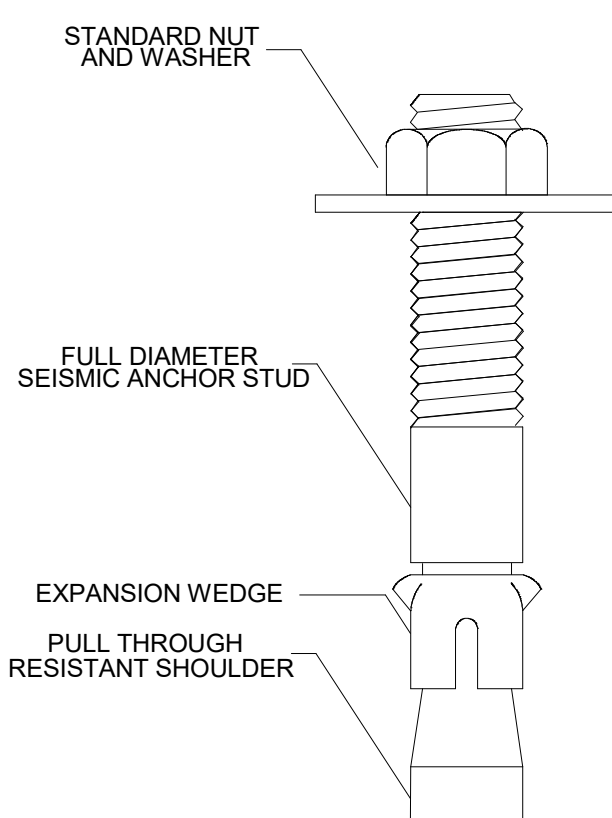
DRAWING NO.:
VC-2



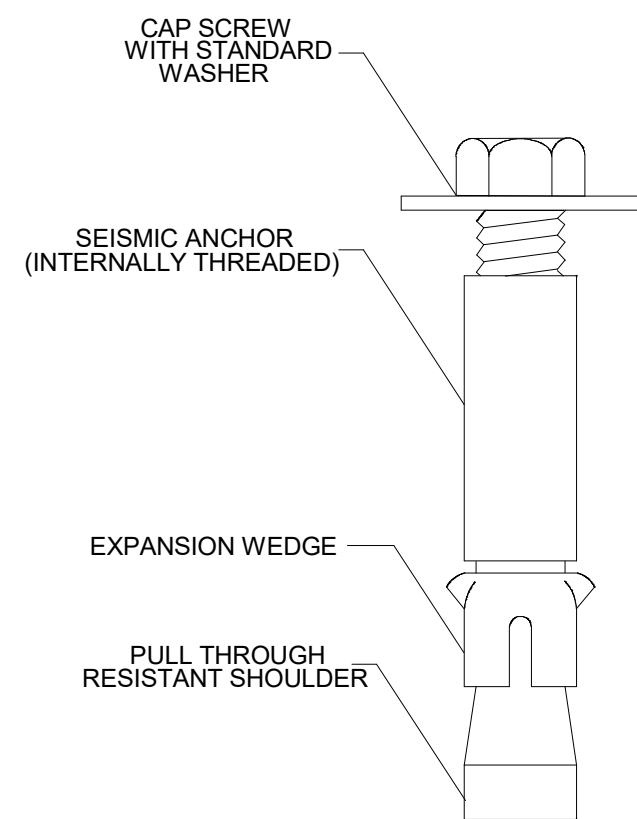
Z1225 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 16



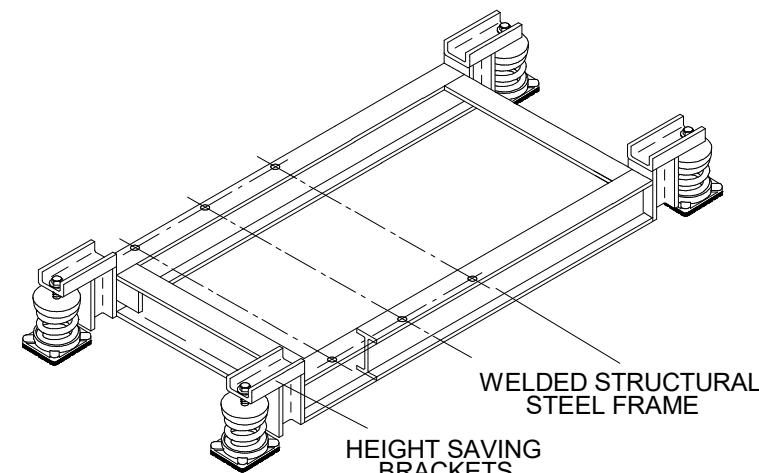
Z1011 ALL DIRECTIONAL SEISMIC SNUBBER
SPECIFICATION 17



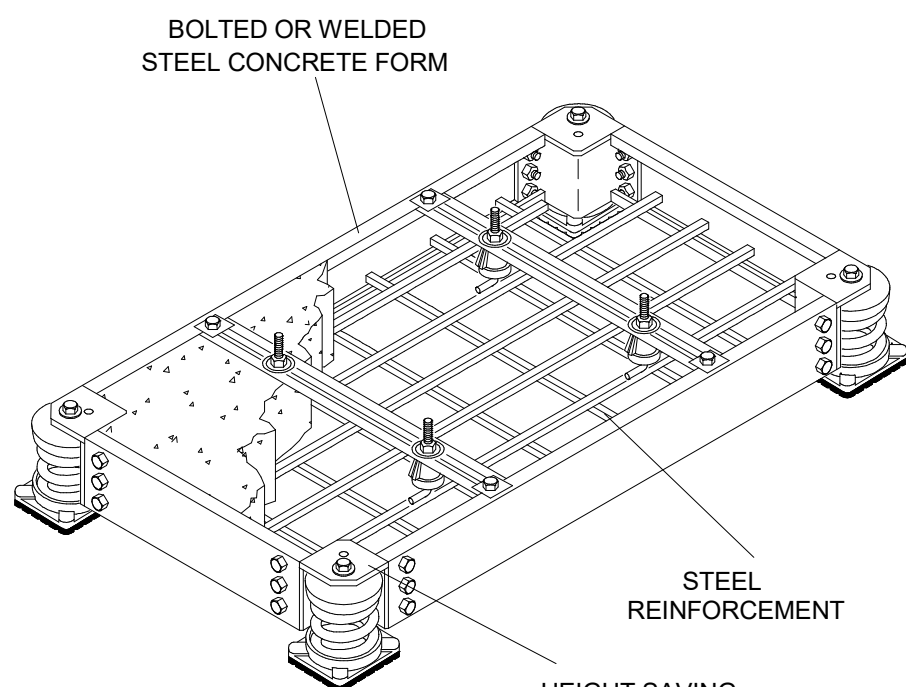
SAS SEISMIC ANCHOR STUD
SPECIFICATION 18



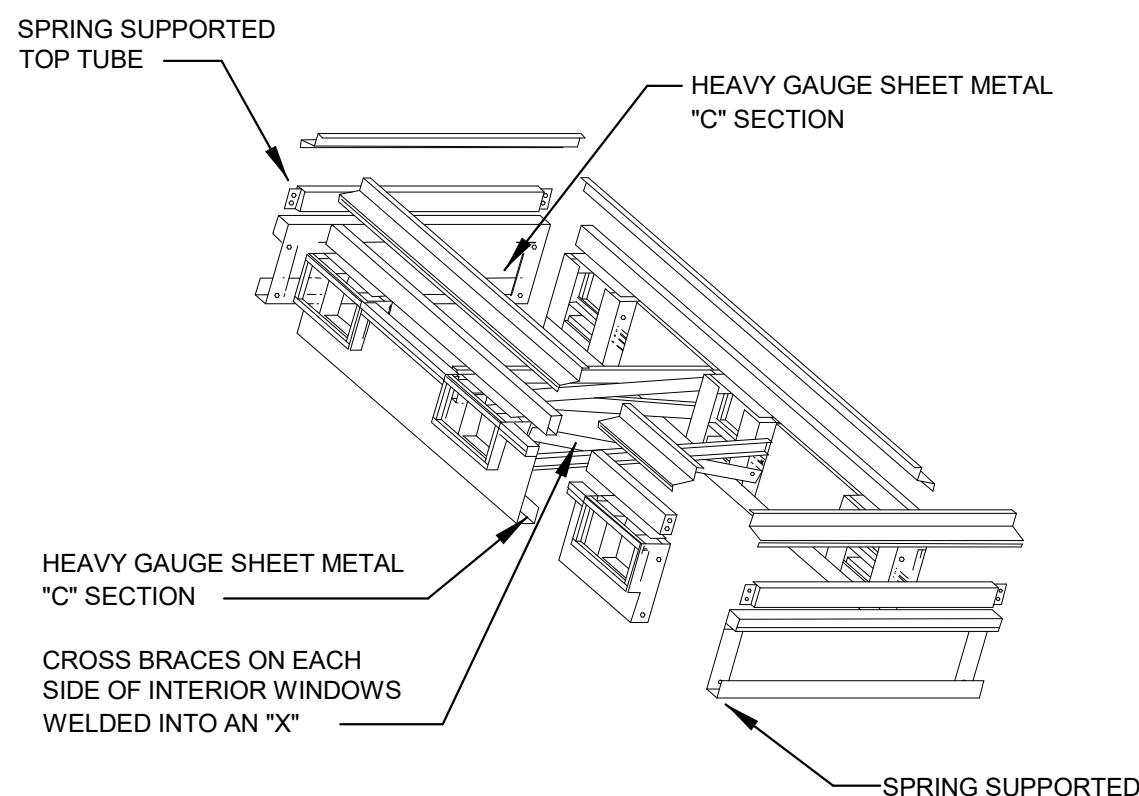
SAB SEISMIC ANCHOR BOLT
SPECIFICATION 19



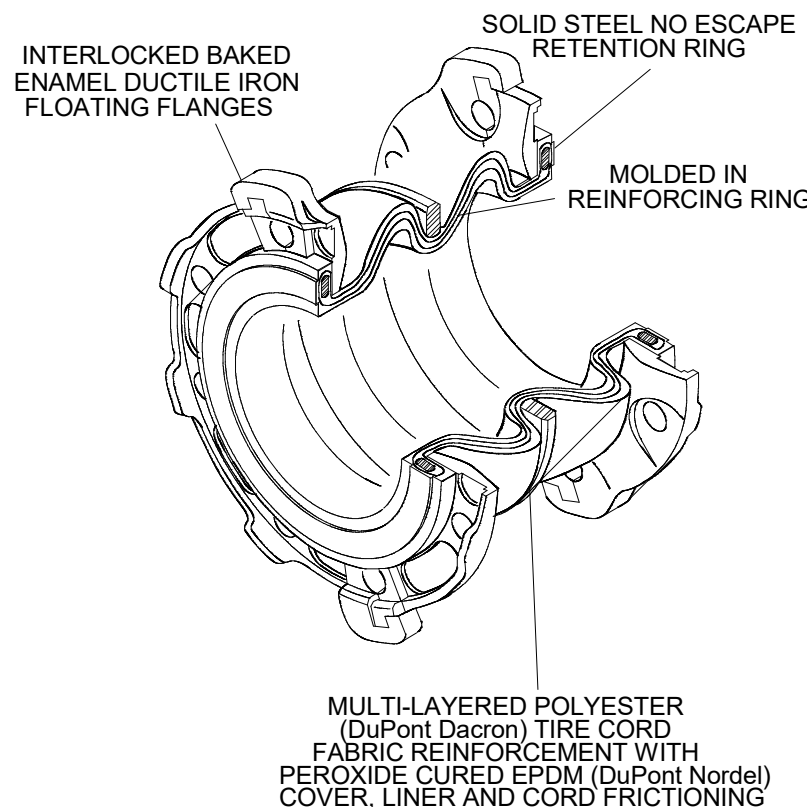
WF WIDE FLANGE STEEL BASE
SPECIFICATION 20



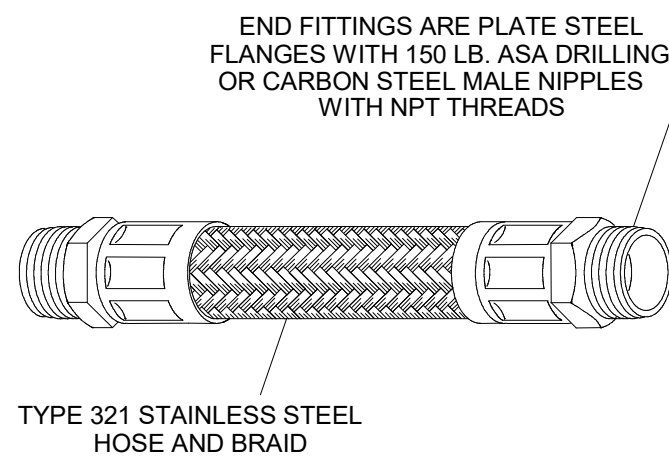
BMK CONCRETE FORM BASE
SPECIFICATION 21



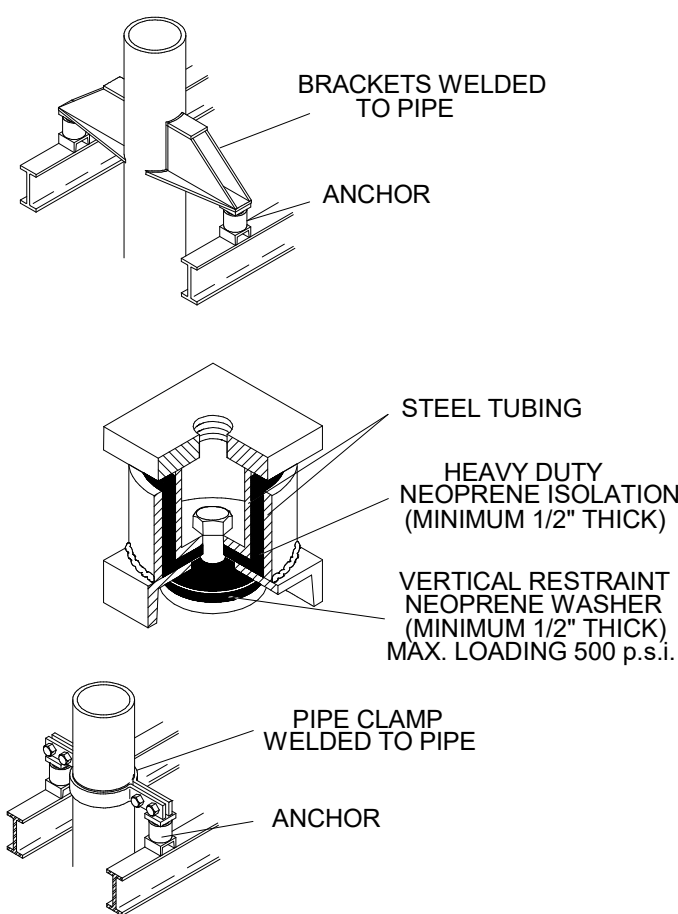
RCS SEISMIC ROOFTOP CURB
SPECIFICATION 22



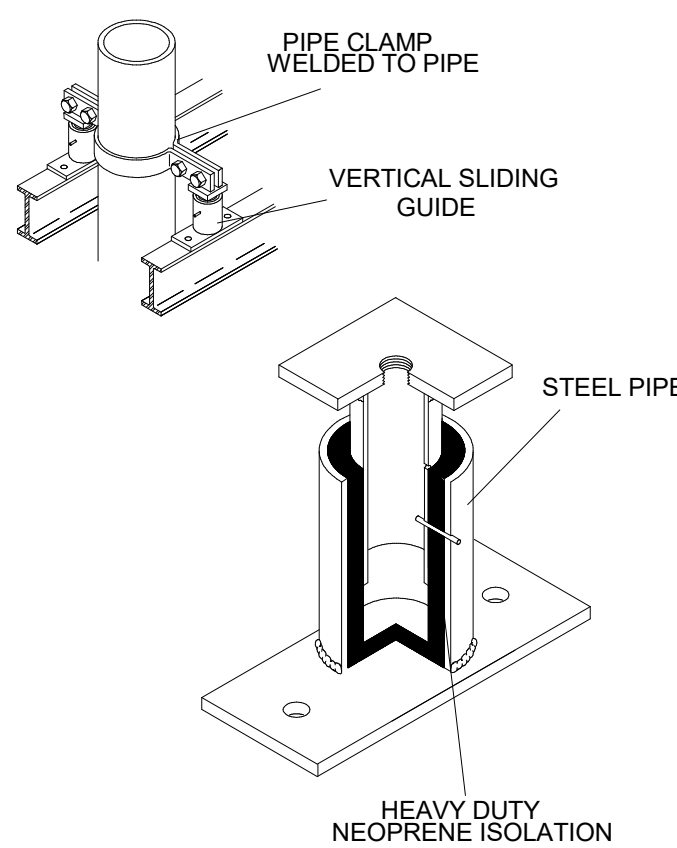
SFDEJ MOLDED EXPANSION JOINT
SPECIFICATION 23



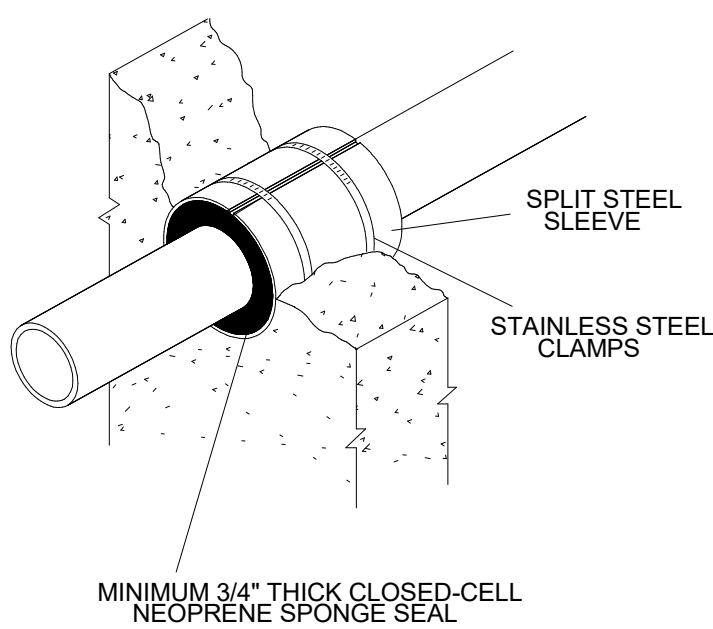
BSS STAINLESS STEEL HOSE
SPECIFICATION 24



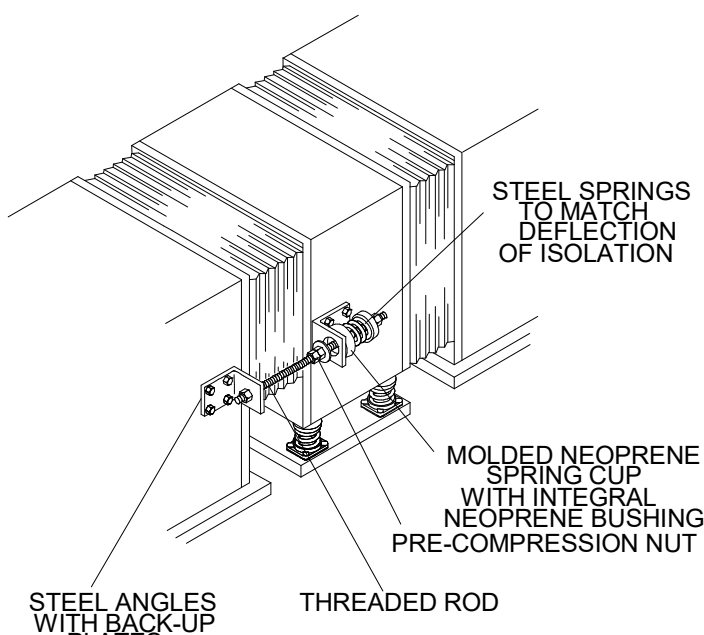
ADA ALL DIRECTIONAL ANCHOR
SPECIFICATION 25



VSG VERTICAL SLIDING GUIDES
SPECIFICATION 26



SWS ACOUSTICAL WALL, CEILING
OR FLOOR SEAL
SPECIFICATION 27



WB HORIZONTAL THRUST RESTRAINTS
USED IN PAIRS
SPECIFICATION 28

LEGEND NOTES: THIS SHEET IS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS AND SHALL BE USED AS A DICTIONARY TO DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT. ALL EQUIPMENT IS TO BE PROVIDED UNDER THIS SECTION UNLESS SPECIFICALLY INDICATED OTHERWISE.

CLG (F) MANUAL PULL STATION WITH STOPPER 2 ALARMED COVER - MTD 48" AFF TO C.

- ### EXISTING EQUIPMENT

- ## WIRING AND RACEWAYS

- ## MECHANICAL EQUIPMENT

- EF EXHAUST FAN - F & I BY HVAC, WIRED BY E.C.

EMERGENCY POWER SHUNT TRIP - RED MUSHROOM HEAD WITH EXTENDED GUARD EQUAL TO SQUARE D NO. KR5RH13-K68 WITH EMERGENCY OFF LEGEND. MOUNT AT 48" AFF., U.O.I. PROVIDE NAMEPLATE INDICATING LOAD CONTROLLED "B" - INDICATES BREAK GLASS STATION WITH HAMMER SUPPORT CLIP AND FIVE REPLACEMENT DISCS STORED INSIDE BOX SUPPORTING DEVICE

- 
 DETAIL IDENTIFIER-INDICATES DETAIL #1 ON DWG. E-3
- 
 SOLENOID VALVE-F&I BY P.C., WIRED BY E.C.

TYPICAL OUTLET NOTATIONS (typically mtd. at 18" a.f.f., uno)

- ## POWER

- 120/208 VOLT, 3 PHASE, 4 WIRE PANELBOARD.
- PANELBOARD FLUSH MOUNTED.
- JUNCTION BOX - SIZE AS REQUIRED.
- FUSED DISCONNECT SWITCH HEAVY DUTY TYPE "3R" INDICATES THE NEMA 3R 20 → INDICATES TIME DELAY FUSE TYPE.
30 → INDICATES SAFETY SWITCH SIZE
- UNFUSED DISCONNECT SWITCH HEAVY DUTY TYPE "3R" INDICATES NEMA 3R
- HORSEPOWER RATED THERMAL SWITCH WITH PILOT LIGHT

	LOAD-BREAK SWITCH.
	CIRCUIT BREAKER.
	KIRK-KEY INTERLOCK.
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER.
	CONTACT, NORMALLY OPEN (NO).
	CONTACT, NORMALLY CLOSED (NC).

-  POWER TRANSFORMER.
 FUSE, SIZE AS INDICATED.
 GROUND FAULT SENSOR & RELAY.
 DRAWOUT CIRCUIT BREAKER.
 SWITCH AND FUSE.
"400A" - INDICATES AMPERE SWITCH SIZE.
"300A" - INDICATES AMPERE FUSE SIZE.
 SYSTEM GROUND OR EQUIPMENT GROUND.

A = AMPERE
AL = ALUMINUM
AF = AMP FRAME
AFF = ABOVE FINISHED FLOOR
AFG = ABOVE FINISHED GRADE
AFC = INTERRUPTING CAPACITY
ALCS = AUTOMATED LIGHTING CONTROL SYSTEM
ARCH = ARCHITECT
AIR = AIR TRIP
ATC = AUTO-TEMP CONTROL CONTRACTOR
ATS = AUTOMATIC TRANSFER SWITCH
AWG = AMERICAN WIRE GAUGE
C = CONDUIT (GENERIC TERM FOR RACEWAY PROVIDED AS SPECIFIED)
CATV = CABLE TELEVISION
CB = CIRCUIT BREAKER
CKT = CIRCUIT
CLG = CEILING
CU = COPPER
C = CENTERLINE
D = DEEP
DWG = DRAWING
EC = ELECTRICAL CONTRACTOR
EWIC = ELECTRIC WATER COOLING
EUT = ELECTRICAL METALLIC TUBING
FA = FIRE ALARM
FPC = FIRE PROTECTION SYSTEM CONTRACTOR
FI = (DETECTED AND INSTALLED)
G. NID = GROUND
GC = GENERAL CONDITIONS
GFI = GROUND FAULT INTERRUPTER
HAVC = HEATING, VENTILATING, AND AIR CONDITIONING CONTRACTOR/HORSEPOWER
HSP = HANGING SHEET PAPER
IG = ISOLATED GROUND
IMC = INTERMEDIATE METALLIC CONDUIT
IT = INFORMATION TECHNOLOGY CONTRACTOR
JB = JUNCTION BOX
KCMIL = THOUSAND CIRCULAR MILS
KES = KITCHEN EQUIPMENT SUPPLIER
KHP = KITCHEN HANGING SHEET PAPER

1. THE SCOPE OF WORK SHALL INCLUDE PROVIDING ALL WORK INDICATED, AND COORDINATION WITH ALL TRADES. SCOPE OF WORK IS INDICATED ON THE CONTRACT DOCUMENTS INCLUDING THE DRAWINGS AND THE SPECIFICATIONS, WHERE COMPLIANCE WITH THE SPECIFICATIONS IS REQUIRED. ANY CONTRACT DOCUMENT SHALL BE CONSIDERED PART OF THE SCOPE OF WORK. IN GENERAL, WORK REQUIREMENTS ARE NOT INDICATED IN BOTH DOCUMENTS, WHERE DOCUMENTS COULD CONTRADICT THEMSELVES OR WITH CODES AND REGULATIONS, PROVIDE THE HIGHER QUANTITY AND QUALITY AND FOLLOW THE STRICTER REQUIREMENTS.
2. COORDINATE WITH THE GENERAL CONTRACTOR, OTHER TRADES AND MANUFACTURERS EQUIPMENT AND MAKE ALL FINAL CONNECTIONS AS REQUIRED, INCLUDING POWER, CONTROL, AND INSTRUMENTATION.
3. ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH OSHA, NFPA STANDARDS, THE ELECTRICAL CODE AND THE LOCAL GOVERNING AUTHORITIES' THE DRAWINGS AND SPECIFICATIONS DO NOT ATTEMPT TO INDICATE ALL WORK REQUIRED BY CODES AND AUTHORITIES.
4. TEST ALL EQUIPMENT AND SYSTEMS INSTALLED TO CERTIFY COMPLIANCE WITH DRAWINGS, SPECIFICATIONS, CODES, LOCAL AUTHORITIES AND REGULATIONS. INCLUDE LABOR AND COSTS FOR TESTING, REVIEWS, APPROVALS AND CERTIFICATIONS.
5. DRAWINGS ARE DIAGRAMMATIC ONLY. EXACT LOCATION, MOUNTING HEIGHTS OF EQUIPMENT AND RACEWAYS SHALL BE COORDINATED WITH THE REQUIREMENTS OF THE EQUIPMENT REQUIREMENTS AND FIELD CONDITIONS.
6. FURNISH AND INSTALL ALL INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE ELECTRICAL WORK COMPLETE AND READY FOR OPERATION.
7. SUPPORT ALL WORK FROM THE BUILDING STRUCTURE.
8. ALL MOUNTING HEIGHTS ARE TO CENTERLINE UNLESS OTHERWISE INDICATED.
9. IF EXACT MOUNTING OR RACEWAY ROUTINGS ARE NOT INDICATED (LOCATION OR HEIGHT) REQUEST CLARIFICATION PRIOR TO WALLING, OR INSTALLATION.
10. ELECTRICAL WORK SHALL BE RECESSED INTO ROUNDS OR INSTALLED ABOVE HUNG CEILINGS UNLESS OTHERWISE INDICATED.
11. DO NOT INSTALL OUTLETS BACK TO BACK. PROVIDE 24 INCH SPACING IN FIRE RATED WALLS.
12. PROVIDE ELECTRICAL OUTLET PLATE GASKET SCALES AT RECEPTABLES, SWITCHES AND OTHER ELECTRICAL BOXES ON EXTERIOR WALLS AND INTERIOR WALLS WHEN CONDITIONED AND NON-CONDITIONED SPACES.
13. WIRE AND CONDUIT SIZES INDICATED ON HOMERUNS SHALL BE CONTINUOUS THROUGHOUT CIRCUIT.
14. FURNISH AND INSTALL CODE REQUIRED DISCONNECTS WHICH ARE NOT FURNISHED BY THE HVAC OR PLUMBING CONTRACTORS.
15. INSTALL A GREEN GROUNDING CONDUCTOR WITH EACH RACEWAY SIZED IN ACCORDANCE WITH THE ELECTRICAL CODE.
16. PROVIDE WATER TIGHT AND GAS TIGHT SEALS INSIDE AND OUTSIDE OF CONDUITS THAT PENETRATE THE BUILDING BELOW GRADE, O.Z. GEDNEY OR APPROVED EQUAL. PROVIDE WEATHER TIGHT SEAL AT PENETRATIONS ABOVE GRADE.
17. PROVIDE NR1 LISTED SMOKE AND FIRE SEALS AT ALL PENETRATIONS THROUGH FLOORS OR FLOOR HEIGHT (SLAB TO SLAB) WALLS.
18. USE CAUTION TO AVOID DAMAGE TO EXISTING UTILITY LINES AND/OR HARM TO PERSONNEL WORKING IN ADJACENT AREAS.
19. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE COPPER MINIMUM #12 AWG. SIZE UNLESS OTHERWISE INDICATED.
20. PROVIDE A FULL LINE IN EVERY EMPTY CONDUIT PROVIDED UNDER THIS SECTION.
21. WIRING IS INDICATED ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
22. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
23. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE PROVIDED.
24. ALL SWITCH CONTROLS SHALL BE PROVIDED WITH WIRING AND CONDUIT AS REQUIRED.
25. RACEWAYS SHALL BE LIMITED TO SIX CURRENT CARRYING CONDUCTORS (THREE PHASE AND THREE NEUTRALS) AND GROUNDING CONDUCTOR, UNLESS OTHERWISE SPECIFIED. PROVIDE ONE (1) 1/2" RACEWAY CONDUIT FOR EACH SINGLE PHASE RECEPTABLE CIRCUIT UNLESS AN OVERSIZED NEUTRAL IS SPECIFICALLY INDICATED.



- 1 E.C. SHALL REFER TO SPECIFICATIONS AND DRAWINGS FOR QUANTITY OF DEVICES, SPARE CAPACITY, PARTS, ETC.
- 2 E.C. SHALL PROVIDE ALL HARDWARE AND EXACT LOCATION OF HVAC UNITS AND FOR LOCATIONS OF DUCT MOUNTED SMOKE DETECTORS. DETECTORS FURNISHED AND WIRED BY E.C., INSTALLED BY HVAC.
- 3 MECHANICAL E.C. SHALL PROVIDE ALL HARDWARE AND EXACT ALARM CONTROL PANEL WITH AN ADA POWER SUPPLY TO SERVE ALL SPEAKER/STROBE UNITS ON RESPECTIVE FLOOR.
- 4 ALL FIRE ALARM SYSTEM SIGNAL CONDUCTORS SHALL BE #14 AWG, TV, THIN SOL.
- 5 TYPICALLY ALL HORNS/STROBE UNITS SHALL BE WIRED IN A FASHION THAT THE SPEAKER AND STROBE CAN BE SILENCED SIMULTANEOUSLY.
- 6 ALL ELECTRICAL ROOMS ARE (2) HOUR RATED. FIREPROOF PENETRATIONS AS REQUIRED.
- 7 E.C. TYPICALLY REFER TO DOOR HARDWARE, SCHEDULES & DRAWINGS FOR LOCATIONS & QUANTITIES OF HARDWARE EQUIPMENT AFFECTING THIS SECTION. PROVIDE ALL WORK AS REQUIRED.
- 8 E.C. TYPICALLY PROVIDE ALL HARDWARE FOR MAGNETIC DOOR HOLDERS AND OTHER HARDWARE DEVICES WITH HARDWARE SUPPLIER FOR TYPING TO ROUGHING.
- 9 TYPICALLY PROVIDE (1) MONITOR MODULE FOR EACH CARBON MONOXIDE DETECTOR.
- 10 MECHANICAL EQUIPMENT, MOTORIZED FIRE/SMOKE DAMPER - FURNISHED & INSTALLED BY HVAC, WIRED BY E.C. FIRE ALARM INTERLOCK WIRING BY E.C. PROVIDE ALL HARDWARE AND EXACT LOCATION OF INTERLOCK EACH DAMPER SO THAT DAMPER IS POWERED OPEN AND IS SPRING CLOSED. LOCATE CONTROL PANEL AND INTERLOCK WIRING TO EACH DAMPER. PROVIDE ALL HARDWARE DRIVERS FOR DAMPER LOCATIONS. CONNECT TO THE NEAREST 120V BRACED CIRCUIT.
- 11 ALL PULL STATIONS SHALL BE PROVIDED WITH TAMPERPROOF COVERS WITH A RELEASE LATCH.
- 12 CONNECT CONTROL MODULE TO FIRE SHUTTER CONTROL PANEL TO RELEASE UPON ANY FIRE ALARM CONDITION OR AS DIRECTED BY FIRE DEPT. COORDINATE WITH FIRE DEPT. FOR PROPER TESTING.
- 13 TYPICALLY MOUNT CARBON MONOXIDE DETECTORS @ 90° A.F. OR AS DIRECTED BY APPROVED MANUFACTURER.
- 14 REFER TO THE PROJECT SPECIFICATIONS FOR EXACT LOCATION OF ALL FLOOR SWITCHES, TAMPER SWITCHES, TYPING TO ROUGHING.
- 15 ALL AUDIO/VISUAL SHALL BE MOUNTED IN ACCORDANCE WITH ADA ROOM REQUIREMENTS FOR AUDIO/VISUAL DEVICES.
- 16 ALL WIRING SHALL BE IN SURFACE METAL RACEWAY IN ACCORDANCE WITH NEC ARTICLE 386, WHERE EXPOSED IN ALL OCCUPIED SPACES WHERE PUBLIC HAS ACCESS.
- 17 ALL DETECTION & SIGNAL WIRING SHALL BE CLASS "A".
- 18 SUBMIT A SET OF SHOP DRAWINGS COMPLETE FLOOR PLANS & RISERS WITH ALL DEVICES AND WIRING TO BE INSTALLED.
- 19 PROVIDE ISOLATION MODULE FOR EVERY 25 DEVICES (TYPICAL).



1. PROVIDE ALL RELAYS, PUSH BUTTONS, TRANSFORMERS, CONTACTORS SHUNT TRIP CIRCUIT BREAKERS, WIRING AND CONDUITS FOR A COMPLETE POWER OFF SYSTEM AND ALARM NOTIFICATION AND DESCRIBED IN PARAGRAPHS 2 & 3 BELOW.
2. THE ACT OF PUSHING ANY EMERGENCY POWER OFF PUSH-BUTTON, SHALL CAUSE THE FOLLOWING TO OCCUR:
 - a. TURN OFF POWER TO THE GAS SOLENOID.
 - b. TURN OFF POWER TO ALL ITEMS UNDER KITCHEN HOOD. REQUIRING ELECTRICAL CONNECTION OR CONTROL BY TURNING OFF POWER TO KITCHEN PANEL VIA SHUNT TRIP MAIN BREAKER.
3. THE ACTIVATION OF HOOD FIRE SUPPRESSION SYSTEM, SHALL CAUSE THE FOLLOWING TO OCCUR:
 - a. TURN OFF POWER TO THE GAS SOLENOID.
 - b. TURN OFF POWER TO ALL ITEMS UNDER KITCHEN HOOD. REQUIRING ELECTRICAL CONNECTION OR CONTROL BY TURNING OFF POWER TO KITCHEN PANEL VIA SHUNT TRIP MAIN BREAKER.
 - c. SEND A SIGNAL TO THE FIRE ALARM CONTROL PANEL TO INITIATE (FACP) SYSTEM OPERATION.
4. COORDINATE WITH INSTALLERS OF FIRE SUPPRESSION SYSTEM, AND KITCHEN EQUIPMENT SUPPLIER.
5. ONE SYSTEM REQUIRED PER HOOD.
6. KITCHEN HOOD SHALL PUT THE HOOD FIRE SUPPRESSION SYSTEM CONTROL PANEL, UPON ACTIVATION, INTO SUMMARY: THE HOOD INTO "AUTO" ALARM MODE AND SHALL ALSO SHUTDOWN EXHAUST FAN. TURN OFF POWER TO THE GAS SOLENOID AND TURN OFF POWER TO ALL ITEMS UNDER THE KITCHEN HOOD. THE HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE. FIRE ACTIVATED DAMPERS IF INSTALLED IN THE EXHAUST OUTLET SHALL SHUT DOWN. KITCHEN HOOD EXHAUST FAN SHALL BE REQUIRED TO RESTART THE EXHAUST FAN WHEN THE EXHAUSTING SYSTEM IS ACTIVATED IF THE EXHAUST FAN CONTINUING TO OPERATE. IF THE EXHAUST FAN HAS PREVIOUSLY BEEN SHUTDOWN, SHUTOFF SHALL REQUIRE MANUAL RESET.



LIGHTING FIXTURE SCHEDULE ① ②								
TYPE	MANUFACTURER	MODEL / SERIES	MTG.	VOLTAGE	LIGHTING SOURCE			KEYED NOTES
					LUMENS	WATTS	SOURCE/CCT	
LS8	DAY-BRITE	FSW-8-110L-835-UNV	P	UNIVERSAL	10,347	80.8	LED/3500K	8' LINEAR WRAPAROUND FIXTURE WITH FROSTED ACRYLIC LENSING AND RIGID STEM MOUNTING (COORDINATE LENGTH IN FIELD)
MOUNTING DESIGNATIONS								
P	PENDANT	U	UNIVERSAL					

LIGHTING FIXTURE SCHEDULE NOTES ()

- LIGHTING FIXTURE PACKAGE SUBMITTALS SHALL BE FULLY COORDINATED BETWEEN THE ELECTRICAL CONTRACTOR, LIGHTING FIXTURE REPRESENTATIVE(S), AND LIGHTING MANUFACTURERS TO ENSURE ALL PRODUCT, INSTALLATION, AND CONTROL REQUIREMENTS ARE MET PRIOR TO SUBMISSION FOR REVIEW. IT IS THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO PROVIDE A PACKAGE MEETING ALL REQUIREMENTS OF THE PROJECT FOR A COMPLETE AND FULLY FUNCTIONAL LIGHTING SYSTEM.
- PROVIDE FIXTURES FROM MANUFACTURERS WITH A DOCUMENTED HISTORY OF SUPPLYING PRODUCTS SPECIFIED FOR A MINIMUM OF 5 YEARS. PROVIDE STATEMENT OF COMPLIANCE WITH SUBMITTALS.

LIGHTING GENERAL NOTES

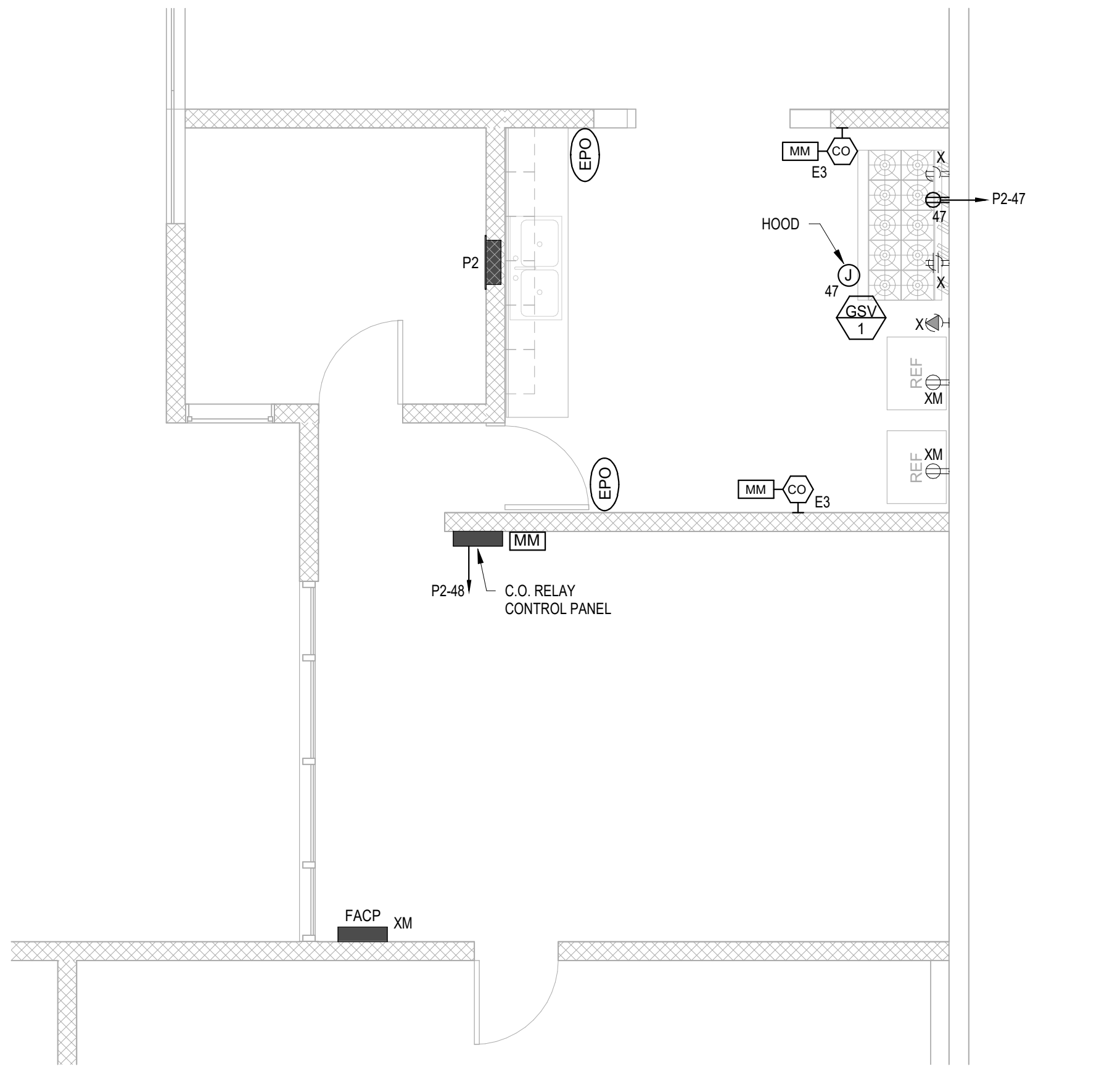
- MANUFACTURERS AND CATALOG NUMBERS IDENTIFIED IN THE "LIGHTING FIXTURE SCHEDULE" SHALL SERVE TO ESTABLISH THE BASIS OF DESIGN FOR EACH LIGHTING FIXTURE TYPE. PRODUCTS OF EQUAL APPEARANCE, CONSTRUCTION, PERFORMANCE, AND WARRANTY COVERAGE FROM MANUFACTURERS OTHER THAN THOSE IDENTIFIED MAY BE PROPOSED FOR USE ON THIS PROJECT, SUBJECT TO REVIEW AND APPROVAL BY THE ARCHITECT AND ENGINEER. THE "FIXTURE MANUFACTURER OPTIONS (OR EQUAL)" LISTING IS PROVIDED FOR GUIDANCE IN IDENTIFYING MANUFACTURERS CAPABLE OF PROVIDING EQUAL PRODUCTS, BUT IN NO WAY LIMITS MANUFACTURERS OR PRODUCTS THAT MAY BE PROPOSED AS EQUALS FOR THE PROJECT.
- "LIGHTING FIXTURE SCHEDULE" REMARKS, "LIGHTING FIXTURE SCHEDULE NOTES", "LIGHTING GENERAL NOTES", AND NOTATIONS ELSEWHERE MAY INDICATE FEATURES AND ACCESSORIES THAT ARE NOT INDICATED IN THE CATALOG NUMBER BUT ARE REQUIRED FOR THE PROJECT. PRODUCTS OTHER THAN THOSE SPECIFIED SUBMITTED SHALL BE DOCUMENTED FOR CONFORMANCE IN PERFORMANCE, CONSTRUCTION, AND APPEARANCE WITH THE CRITERIA ESTABLISHED BY THE SPECIFIED PRODUCT.
- FURNISH ALL LIGHTING FIXTURES COMPLETE WITH MOUNTING ACCESSORIES TO MEET THE JOB REQUIREMENTS. VERIFY ROOM SURFACE CONSTRUCTION AND FINISHES PRIOR TO ORDERING FIXTURES TO ENSURE PROPER MOUNTING PROVISIONS AND FIXTURE FITTINGS. REFER TO LATEST ARCHITECTURAL DRAWINGS.
- LED ARRAYS, MODULES, AND LIGHT ENGINES SHALL HAVE KELVIN COLOR TEMPERATURE AS SCHEDULED HAVING A MINIMUM COLOR RENDERING INDEX (CRI) OF 82 AND A MINIMUM L70 LIFETIME RATINGS OF 50,000 HOURS AT 25°C AMBIENT. LED DRIVERS SHALL HAVE 0-10V DIMMING CONTROL WITH FULLY ISOLATED CONTROL INPUTS AND MINIMUM POWER LEVEL OF 10%/%. LED FIXTURES WITH ARRAY / MODULE AND DRIVER PACKAGES OR LIGHT ENGINES SHALL HAVE PUBLISHED IESNA LM-79 AND LM-80 TESTING DATA AS A STANDARD MANUFACTURED OFFERING. INDIVIDUAL COMPONENT TESTING DATA WILL NOT BE ACCEPTED. ALL FIXTURES SHALL BE "DESIGN LIGHTS CONSORTIUM" (DLC) OR "ENERGY STAR" LISTED, OR FURNISHED WITH DATA INDICATING CONFORMANCE WITH LATEST APPLICABLE LISTING CRITERIA.
- PROVIDE TYPE AND QUANTITY OF DRIVERS AND TRANSFORMERS AS REQUIRED TO PROVIDE CONTROL METHOD INDICATIONS ON THE PLANS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING. SWITCHING SUBSCRIPTS, NOTES, SCHEDULE REMARKS / DESCRIPTIONS, AND DETAILS. QUANTITY OF DRIVERS AND TRANSFORMERS SHALL BE THE MINIMUM REQUIRED TO PROVIDE CONTROL INDICATED TO MAINTAIN THE LOWEST CONNECTED LOAD OF LIGHTING SYSTEM POSSIBLE. TANDEM WIRING OF FIXTURES SHALL BE PROVIDED WHERE NECESSARY AND WITHIN THE WIRING DISTANCE RESTRICTIONS OF THE MANUFACTURER'S INSTALLATION REQUIREMENTS.

GENERAL POWER NOTES:

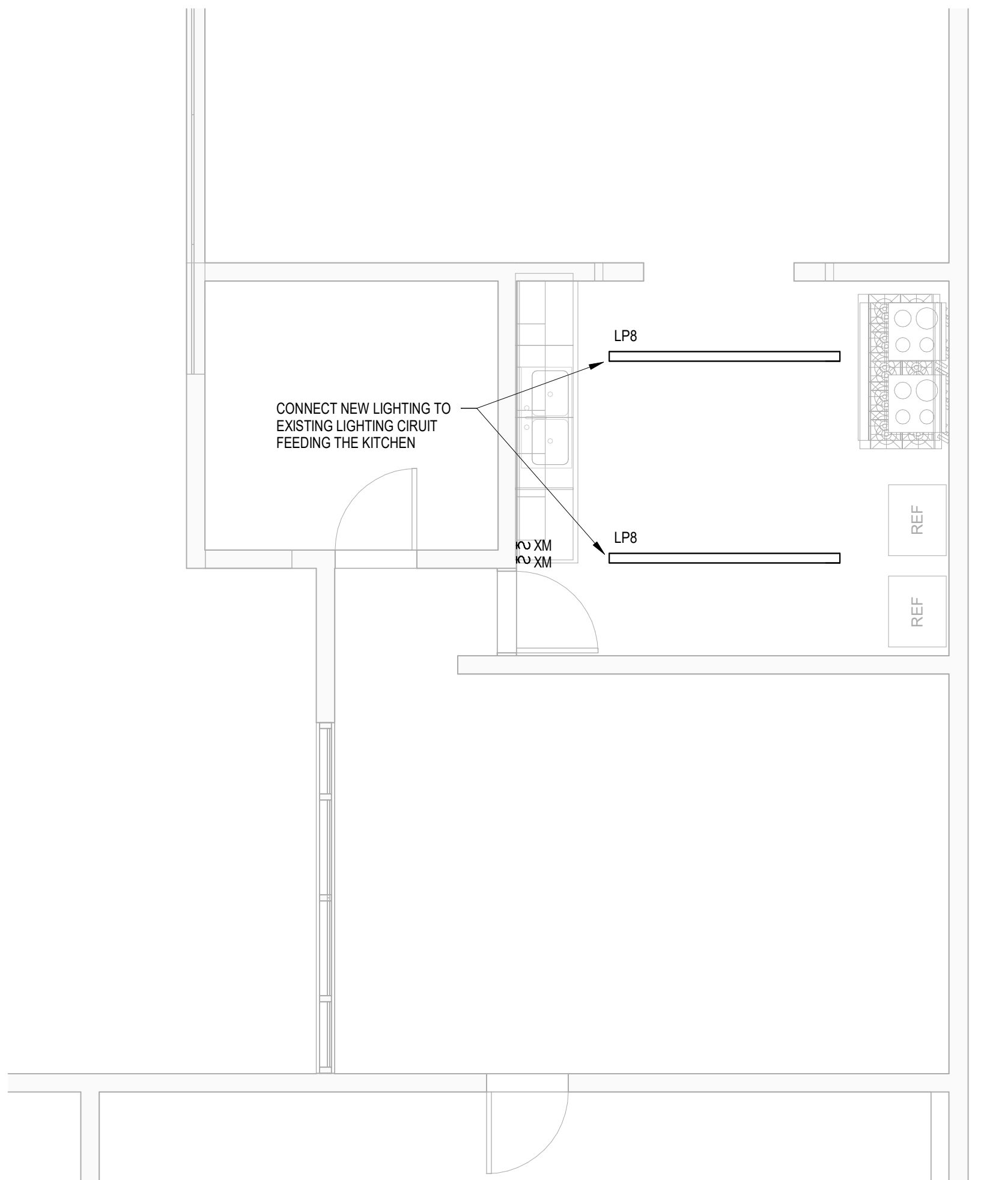
- COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
- REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
- WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
- WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
- ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
- ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER, MINIMUM #12 AWG SIZE, THW/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
- REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH, TAMPER SWITCH, ETC.
- WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS AND BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
- CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
- TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
- PROVIDE ALL EMPTY CONDUITS WITH PULL STRINGS.
- ALL 15 & 20 AMP RECEPTACLES MOUNTED BELOW 5' 6" A.F.F. SHALL BE TAMPER RESISTANT.

GENERAL LIGHTING NOTES:

- EXACT LOCATIONS OF ALL FIXTURES AND DEVICES SHALL BE FULLY COORDINATED WITH ARCHITECTURAL PLANS, ELEVATIONS, SECTIONS AND THE WORK OF OTHER TRADES PRIOR TO ROUGH-IN.
- WIRING AND CONDUIT OR MC CABLE SHALL BE REQUIRED BETWEEN ALL LIGHTING FIXTURES, SWITCHES, DIMMERS, SENSORS, POWER PACKS, RELAYS, AND OTHER AUXILIARY DEVICES. WIRING AND CONDUIT OR MC CABLE IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS. IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT AND CONTROL WIRING SYSTEM BE INSTALLED.
- ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 98% CONDUCTIVITY, COPPER MINIMUM #12 AWG SIZE, THW/THHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
- UTILITIES SHALL NOT PENETRATE STAIR ENCLOSURES, ELEVATOR SHAFTS, AND MACHINE ROOMS EXCEPT WHERE SPECIFICALLY SERVING THAT STAIR OR ELEVATOR.
- METAL ROOF DECKS SHALL NOT BE TAPPED FOR SUPPORT OF ANY LIGHTING FIXTURES OR ELECTRICAL EQUIPMENT. PROVIDE UNISTRUT OR OTHER SUPPLEMENTAL SUPPORT FITTINGS TO BE ATTACHED TO BUILDING STRUCTURAL FRAMING AS REQUIRED FOR SUPPORT OF ALL LIGHTING FIXTURES AND ELECTRICAL EQUIPMENT.
- ALL EXPOSED CONDUITS, RACEWAYS, WIREWAYS, BOXES, FITTINGS AND SIMILAR COMPONENTS SHALL BE PAINTED TO MATCH SURROUNDING FINISH WITH EQUAL TYPE PRODUCT(S).



1 FIRST FLOOR PLAN
E1.02 SCALE: 1/4" = 1'-0"



2 FIRST FLOOR REFLECTED CEILING PLAN
E1.02 SCALE: 1/4" = 1'-0"



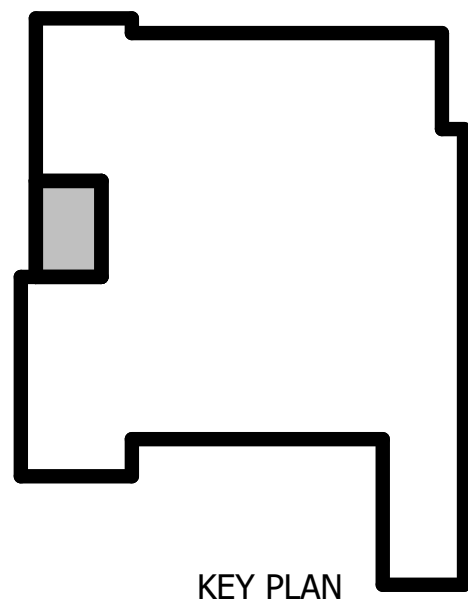
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	BID DOCUMENTS

REVISIONS

DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



0' 4' 8' 16'
SCALE: 1/8" = 1'-0"
PROJECT TRUE



**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: 88513 DRAWN BY: TV

FIRST FLOOR PLAN

DRAWING NO.:
E1.02

GENERAL POWER NOTES:

1. COORDINATE EXACT LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
2. REFER TO MECHANICAL PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL HVAC EQUIPMENT.
3. WIRING IS SHOWN ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL CONDITIONS.
4. WIRING AND CONDUIT SHALL BE REQUIRED BETWEEN ALL OUTLETS INDICATED WITH CIRCUIT NUMBERS AND PANEL DESIGNATIONS.
5. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT IS NOT SHOWN, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED.
6. ALL BRANCH CIRCUIT CONDUCTORS SHALL BE 90% CONDUCTIVITY COPPER, MINIMUM #12 AWG SIZE, THW/NTHHN INSULATION, 600 VOLTS RATED UNLESS OTHERWISE NOTED.
7. REFER TO FIRE PROTECTION PLANS FOR ANY CHANGES AND FOR EXACT LOCATION OF ALL FLOW SWITCH, TAMPER SWITCH, ETC.
8. WHERE CONDUITS AND/OR BOXES CANNOT BE FLUSH MOUNTED IN BUILDING PROVIDE A SYSTEM OF SURFACE METAL RACEWAYS AND BOXES IN ACCORDANCE WITH ARTICLE 386, EQUAL TO WIREMOLD FOR ALL FINISH SPACES WHERE PUBLIC HAS ACCESS, INCLUDING CORRIDORS, CLASSROOMS, OFFICES, ETC.
9. CONFIRM RATINGS & FINAL LOCATIONS OF EQUIPMENT WITH OWNER PRIOR TO ROUGHING.
10. TYPICALLY PROVIDE GROUND FAULT INTERRUPTER TYPE RECEPTACLES WITHIN 6 FEET OF WATER SOURCES.
11. PROVIDE ALL EMPTY CONDUITS WITH PULL-STRINGS.
12. ALL 15 & 20 AMP RECEPTACLES MOUNTED BELOW 5' 6" A.F.F. SHALL BE TAMPER RESISTANT.

KAESTLE BOOS
associates, inc

416 Slater Road, New Britain, CT 06053
Phone: 860-229-0361 • Fax: 860-229-5303
Additional offices located in Massachusetts and Rhode Island
Email: kba@kba-architects.com • Web: www.kba-architects.com



GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

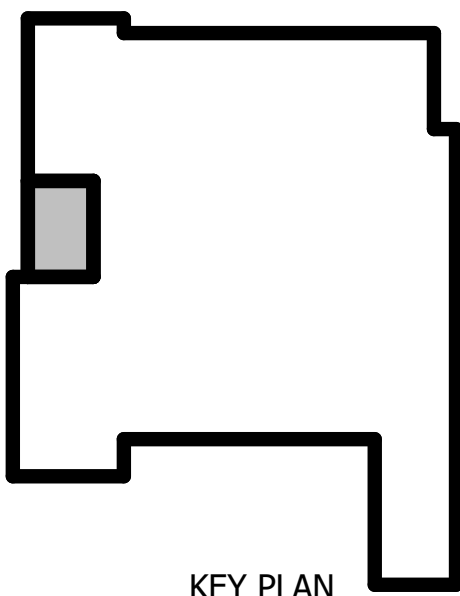
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	BID DOCUMENTS

REVISIONS

DATE	DESCRIPTION

FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



0' 4' 8' 16'
SCALE: 1/8" = 1'-0"
PROJECT TRUE



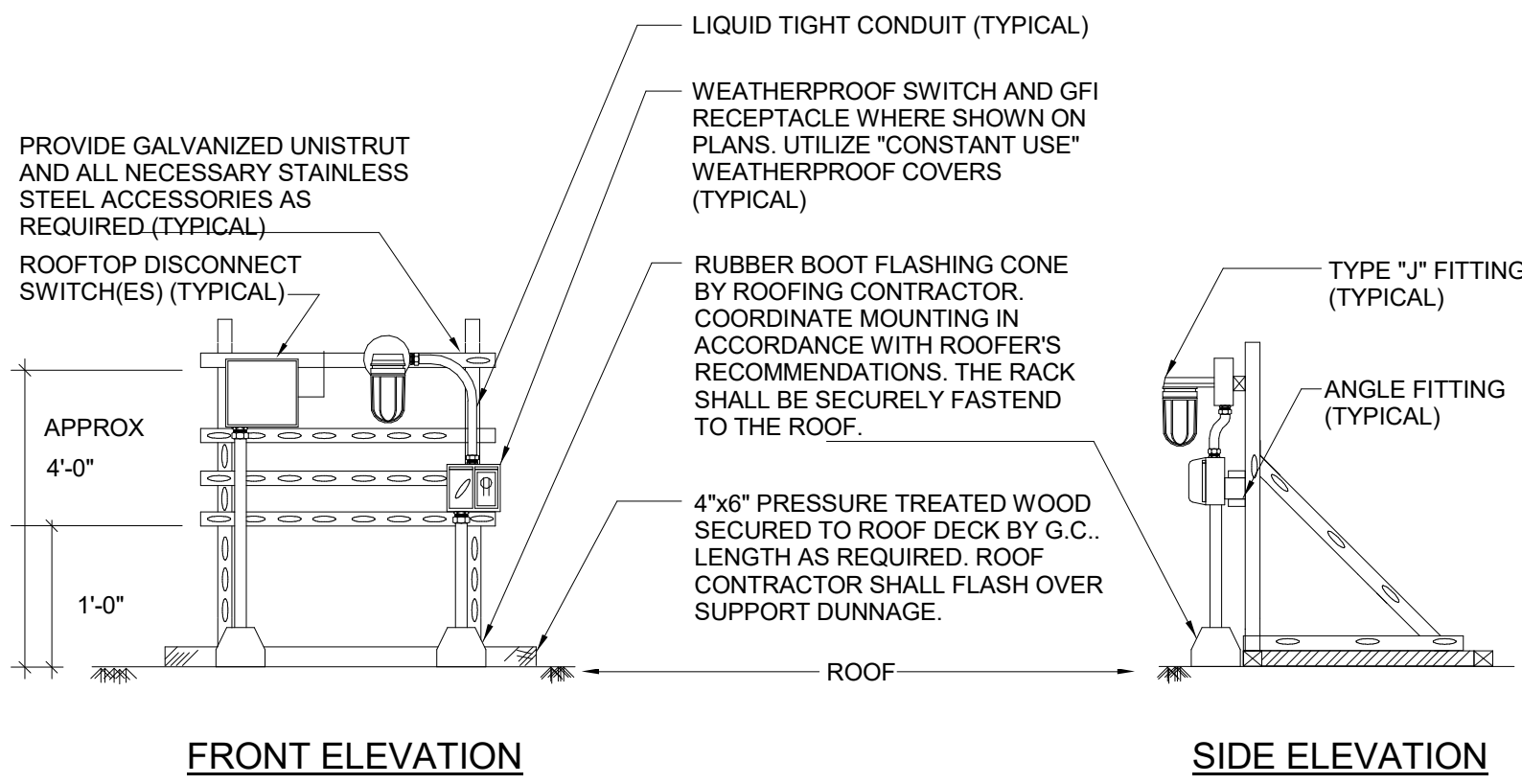
**SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE**
153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

PROJECT NO.: 88513

DRAWN BY: Author

ROOF PLAN

DRAWING NO.:
E1.03



2
E1.03 TYPICAL ROOFTOP DISCONNECT SWITCH(ES) DETAIL
SCALE: N.T.S.

1
E1.03 ROOF
SCALE: 1/8" = 1'-0"

GENERAL DEMOLITION NOTES:

1. REFER TO DEMOLITION SECTION OF SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
2. WHERE DOWNSTREAM DEVICES ARE AFFECTED BY THE DEMOLITION WORK THIS CONTRACTOR SHALL PROVIDE NEW WIRING AS REQUIRED TO MAINTAIN SUCH DOWNSTREAM DEVICES.
3. ALL DEVICES AND/OR EQUIPMENT REMOVED BY THIS CONTRACTOR SHALL BE INSPECTED BY THE OWNER FOR DETERMINATION OF DISPOSAL OR STORAGE AS DIRECTED BY THE OWNER. FOR PURPOSES OF PRICING THIS CONTRACTOR SHALL ASSUME THAT NO DEVICE OR EQUIPMENT WILL BE RE-USED UNLESS SPECIFICALLY NOTED AS SUCH.
4. PARTICULAR CARE SHALL BE TAKEN TO AVOID CREATING HAZARDS ON THE PROJECT OR CAUSING DISRUPTION OF SERVICES REMAINING.
5. ALL EXISTING EQUIPMENT INDICATED TO BE REMOVED SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER. ALL EXISTING EQUIPMENT INDICATED TO BE TURNED OVER TO THE OWNER SHALL BE PRESENTED TO THE OWNER IN GOOD CONDITION AT A LOCATION DESIGNATED BY THE OWNER. ALL OTHER EQUIPMENT SHALL BE REMOVED FROM THE SITE.
6. REMOVE ALL ABANDONED CONDUCTORS AND EQUIPMENT NOT BUILT INTO THE BUILDING CONSTRUCTION. WHERE CEILING AND WALLS ARE REMOVED, ABANDONED WIRING SHALL BE REMOVED, AND ENDS OF LIVE SERVICES TO BE DISCONNECTED AND CUT-OFF.
7. ABANDONED ELEMENTS BUILT INTO WALLS SHALL BE MARKED "ABANDONED"

KAESTLE BOOS
associates, inc

416 Slater Road, New Britain, CT 06053
Phone: 860-229-0361 A Fax: 860-229-5303
Additional offices located in Massachusetts and Rhode Island
Email: kba@kba-architects.com A Web: www.kba-architects.com



GGD CONSULTING ENGINEERS, INC.
375 Faunce Corner Road, Suite D, Dartmouth, MA 02747-1258
p: 508-998-5700 • f: 508-998-0883 • E-MAIL: info@g-g-d.com

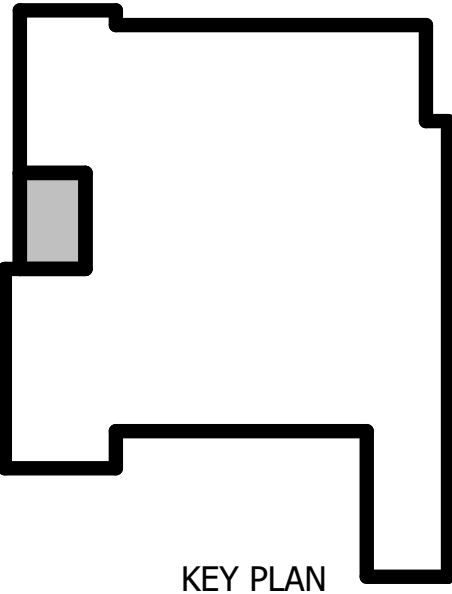
ISSUE DATE

DATE	DESCRIPTION
11/12/2024	BID DOCUMENTS

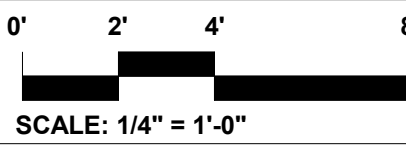
REVISIONS

DATE	DESCRIPTION

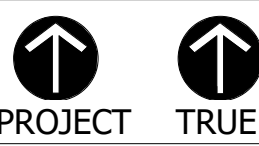
FOR ALL ABBREVIATIONS, SYMBOL LEGENDS,
AND GENERAL NOTES SEE SHEET R0.01



KEY PLAN



SCALE: 1/4" = 1'-0"



SOUTHBRIDGE
SENIOR CENTER
KITCHEN STOVE

153 CHESTNUT STREET,
SOUTHBRIDGE, MA 01550

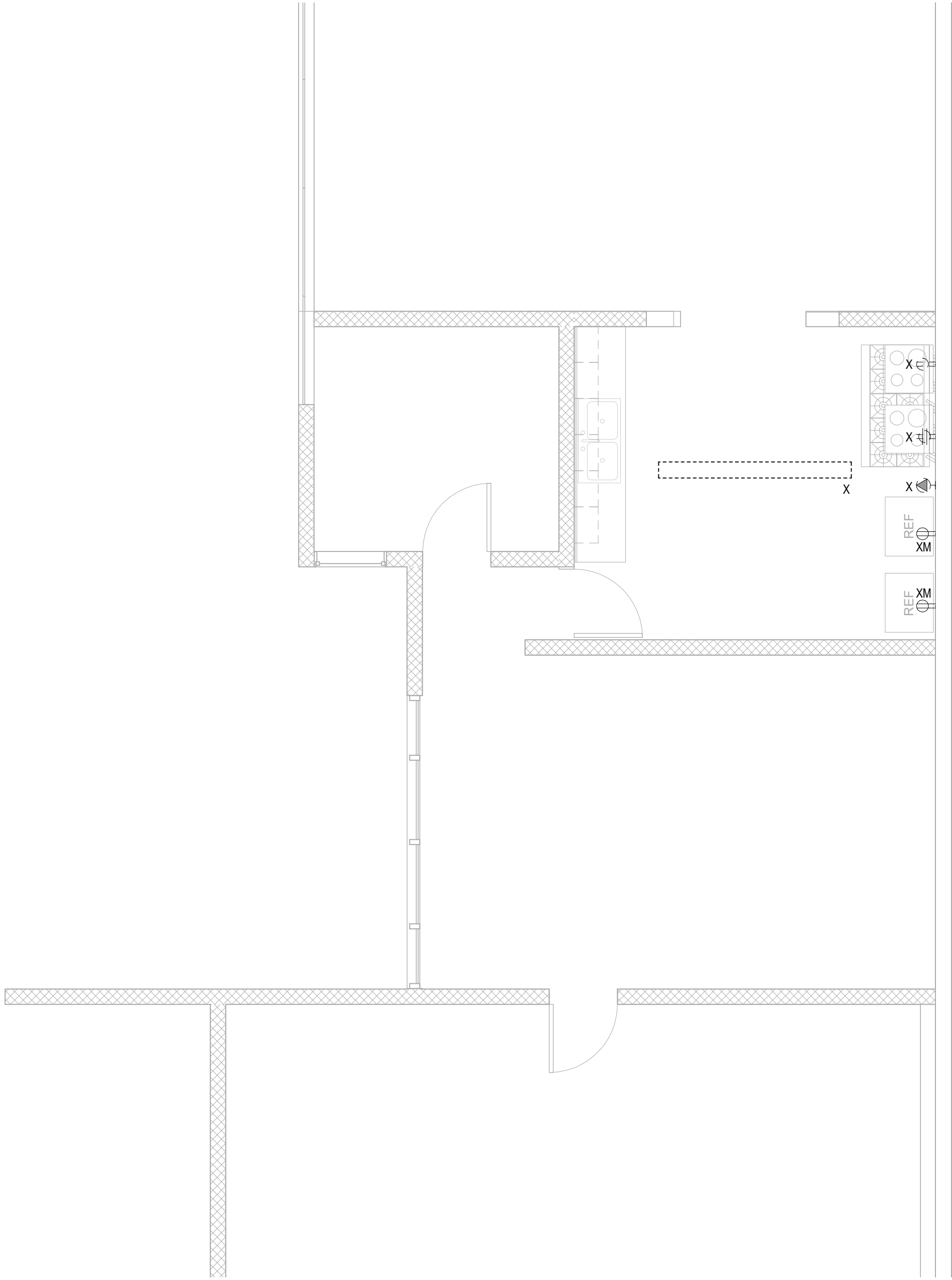
PROJECT NO.: 88513

DRAWN BY: TV

MAIN LEVEL
DEMOLITION PLAN

DRAWING NO.:

ED1.01



1 FIRST FLOOR DEMO PLAN
ED1.01 SCALE: 1/4" = 1'-0"