PROJECT MANUAL

Swanson Road Intermediate School
Boiler Conversion

May 2023

Auburn School District
Joe Fahey, Director of Facilities
10 Swanson Road
Auburn, MA 01501
(508) 832-7755 x 228

NAULT ARCHITECTS INC.
71 HOPE AVENUE WORCESTER, MA 01603
Established 1886
TEL/FAX 508.755.6134 / 508.754.4661
E-mail: admin@naultarchitects.com

SEAMAN ENGINEERING CORPORATION

ART Engineering
we build the future.
38 Front Street FL 3, Worcester, MA 01608

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SECTION 00.11.13

ADVERTISEMENT FOR BIDS

The Auburn School District, the Awarding Authority, invites sealed bids from Contractors for the Swanson Road Intermediate School Boiler Conversion in accordance with the documents prepared by Nault Architects, Inc.

The Project consists of: The replacement of oil-fired boilers with new gas-fired boilers.

The work is estimated to cost $ **325,000.00 Base Bid**

Bids are subject to M.G.L. c.149 §4A-J & to minimum wage rates as required by M.G.L. c.149 §§6 to 27H inclusive. General bidders must be certified by the Division of Capital Asset Management and Maintenance (DCAMM) in the category of **HVAC**.

General Bids will be received online at ProjectDog.com until **2:00PM on Wednesday May 31, 2023** and published forthwith.

Filed sub-bids for the trades listed below will be received online at ProjectDog.com until **2:00 PM on Wednesday May 24, 2023** and opened forthwith.

Filed sub-bidders must be DCAMM certified for the trades listed below and bidders must include a current DCAMM Sub-Bidder Certificate of Eligibility and a signed DCAMM Sub-Bidder's Update Statement.

SUBTRADES: Section 22.00.00 - Plumbing
Section 26.00.00 - Electrical

This project is being Electronically Bid (E-Bid). All bids shall be submitted online at www.Projectdog.com. Hard copy bids will not be accepted by the Awarding Authority. E-Bid tutorials and instructions are available within the specifications and online at www.Projectdog.com. For assistance, call Projectdog, Inc at (978) 499-9014, M-F 8:30AM - 5PM.

General bids and sub bids shall be accompanied by a bid deposit that is not less than five (5%) of the greatest possible bid amount (considering all alternates), and made payable to the **Auburn School District**. Bid forms and contract documents will be available at www.Projectdog.com or for pick-up at: Projectdog, Inc, 18 Graf Road, Suite 8 Newburyport, MA 978-499-9014 (M-F 8:30AM - 5PM).

Go to www.Projectdog.com and login with an existing account or click Sign Up to register for free. Enter Project Code **855839** in the project locator box. Select “Acquire Documents” to download documents, review a hard copy at Projectdog’s physical location, or request a free project CD.

Bidders may obtain one full paper bid set from Projectdog for a refundable deposit of **$50.00** made payable to Projectdog in the form of certified check or money order. The full amount of the deposit will be refunded to all responsive bidders returning the Contract Documents in good condition within ten (10) days after date of general bid opening. Otherwise, the deposit will become the property of Projectdog, Inc. Bidders requesting their refundable paper set to be mailed must supply a non-refundable shipping and handling fee of **$35.00** payable to Projectdog.

The job site and/or existing building(s) will be available for inspection at **9AM** on **05/19/23.** Bidders should meet outside the main entrance to the building (do not enter the school).

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Projectdog, Inc

Supplemental Instructions to Bidders for Electronic Bid Projects (E-Bid)

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Sign Up

Every user of Projectdog.com has a unique username and password for their account. **MANDATORY: All users must keep usernames and passwords PRIVATE and SECURE. Do not share accounts.**

1. Go to **www.Projectdog.com**.
2. Select the "Sign Up" (Fig 1).
3. Complete all required form fields and press Submit. An automatic email will be sent to the registered email.
4. Select the confirmation link in the email to complete the registration.

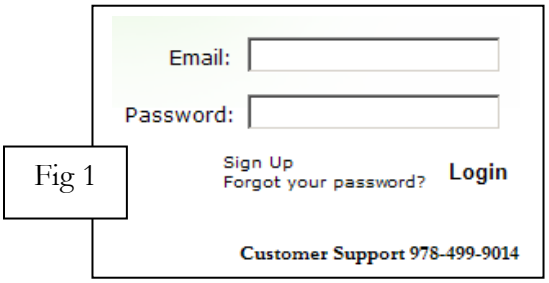


Fig 1

Login

1. Go to **www.Projectdog.com**.
2. Enter a registered email address and password (Fig 1).
3. Press Login.

Fig 2

Logoff

1. Hover over Home (Fig 2).
2. Select "Logoff".

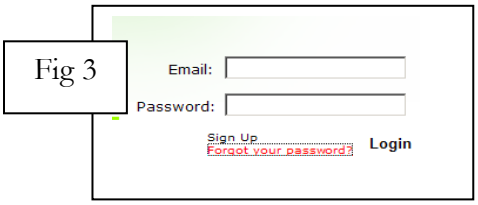


Fig 3

Forgotten Password

1. Select "Forgot your password?" (Fig 3).
2. Enter the e-mail address.
3. Select "Send Info". An automated e-mail will be sent with the password.

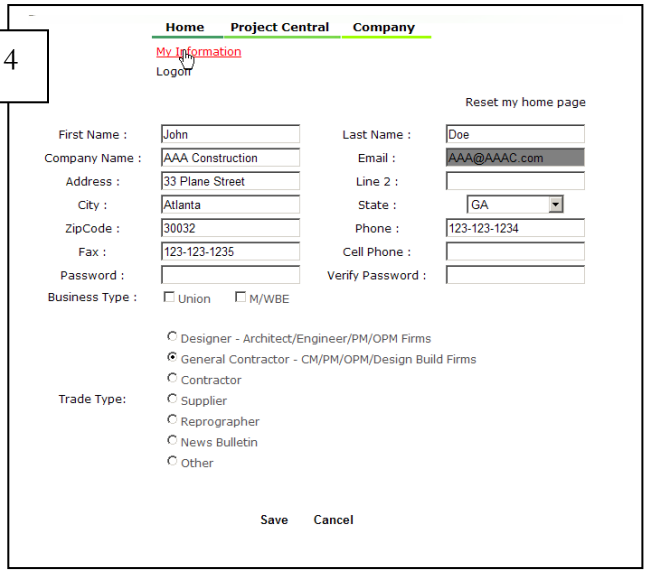


Fig 4

Account Information

View and edit user contact information. To change an email address, users must register a new account. Call Projectdog to have the old account removed.

1. Hover over Home (Fig 4).
2. Click "My Information".
3. Edit information as needed.
4. Click "Save" to finalize edits.

Project Details

Utilize the search page (Fig 5) or enter a Project Code (Fig 6) to view a project's "Project Details" page (Fig 7).

Fig 5

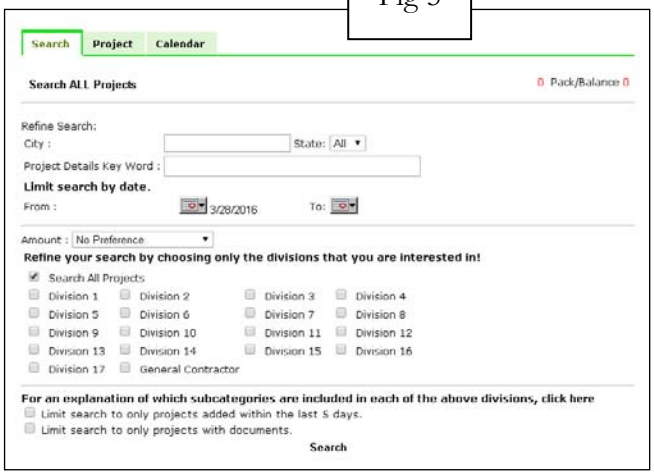
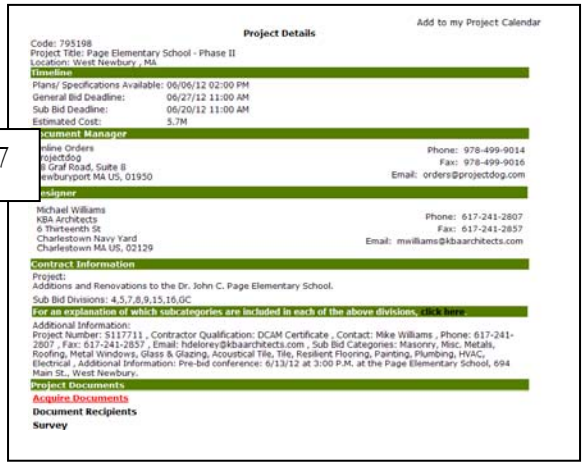


Fig 6

Fig 7



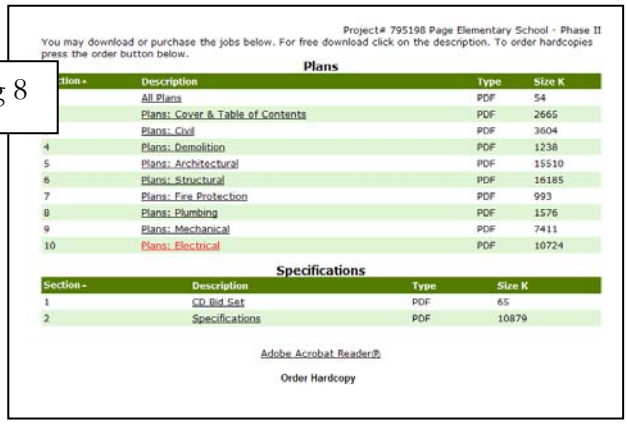
Acquire Documents

Download all project documents.

1. Click "Acquire Documents" link found on a project's "Project Details" page (Fig 7).
2. Respond to the Legal Notice after reviewing.
3. Click on any file description to open, review, or save a document (Fig 8).

   Users are automatically added to the project's "Document Recipients" list to receive update notifications upon viewing any document online.

Fig 8

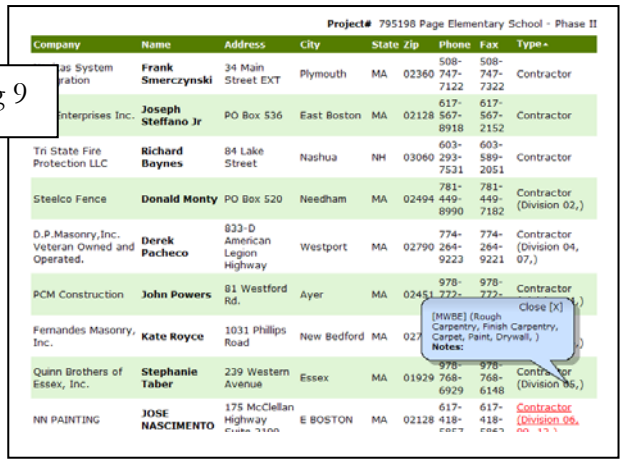


Document Recipients

Review all plan holders who have acquired documents.

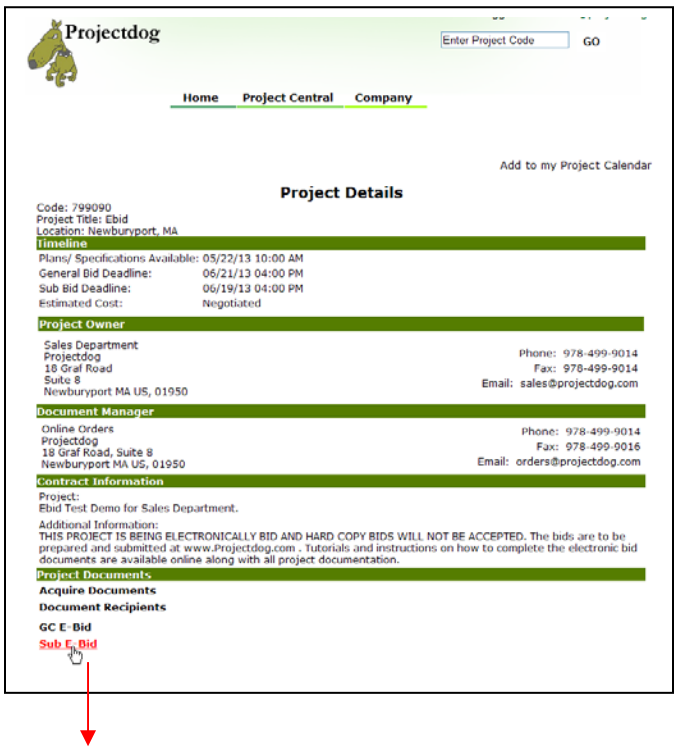
1. Click "Document Recipients" link found on a project's "Project Details" page (Fig 7).
2. All potential bidders are listed and sorted by company type (Fig 9). Click on a column title to sort alphabetically.

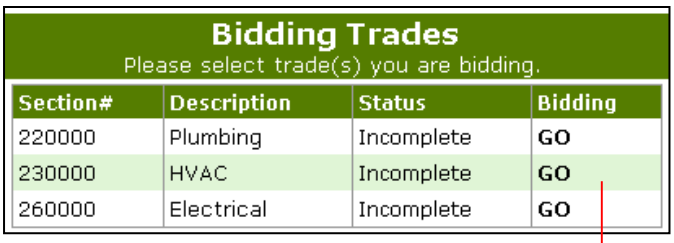
Fig 9

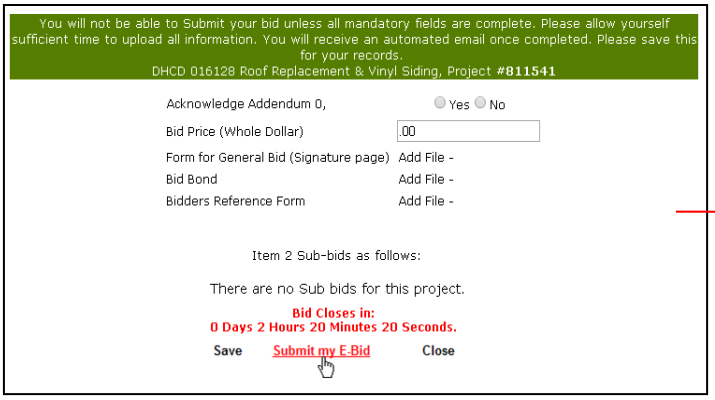


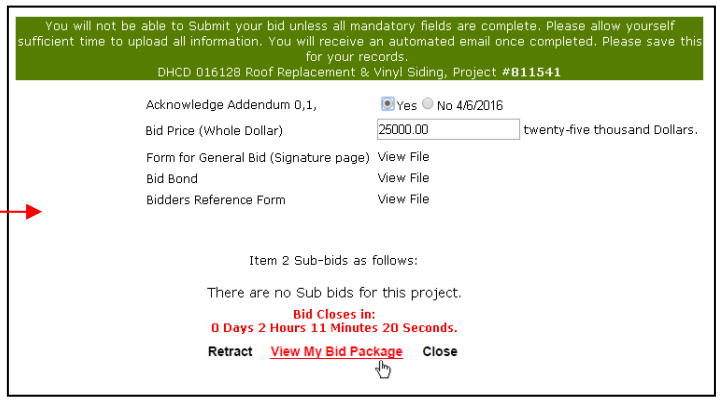
Electronic Bid (E-Bid)

This project is being **Electronically Bid** at www.Projectdog.com. Hard copy bids will not be accepted by the Awarding Authority. Go to www.Projectdog.com and Login with an existing account or click Sign Up to register for free. Enter a project code or search by keyword to access the "Project Details" page. Select "Acquire Documents" to download all bidding documents.









How to Submit an E-Bid

Complete and save all required forms as PDF files. Please be sure to sign all required signatures either digitally or manually.

1. Select the **GC E-Bid** or **Sub E-Bid** link located on the "Project Details" page.

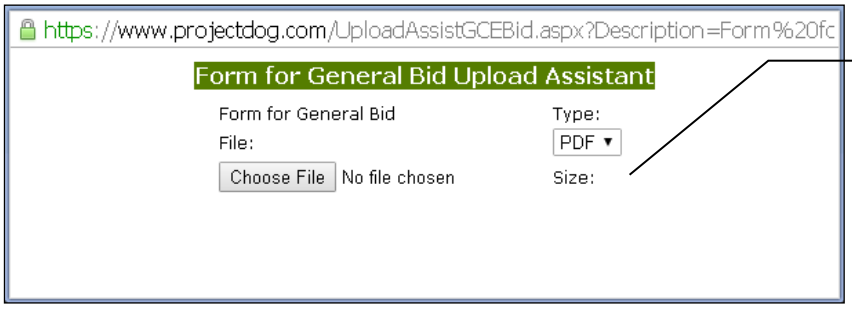
   Subcontractors select a bidding trade;

   General Contractors will not be able to submit an E-Bid until the official sub bid tabulation is released by the Awarding Authority.

2. Answer / enter / upload all required areas. Enter all dollar value amounts as a whole dollar values only.

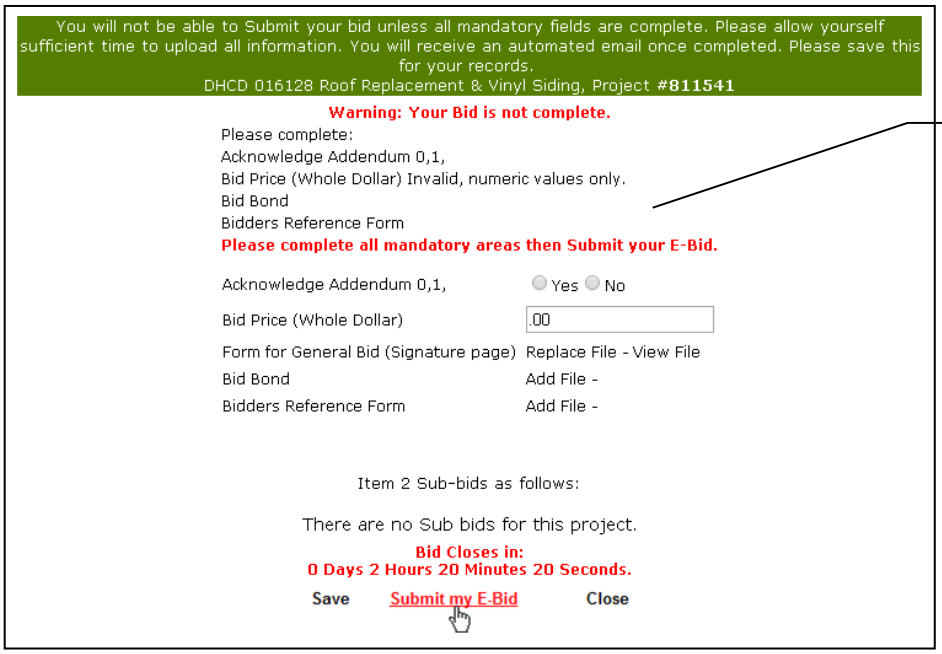
3. Select "Submit My E-Bid." Review the submitted bid package via the "View My Bid Package" link.

It's that simple!



Add File

Click "Add File" on the E-Bid page to open the Upload Assistant window. Then click "Browse" or "Choose File" to upload a PDF file.



Warning

E-Bids cannot be submitted unless all areas are complete.

Save before adding files or closing the window or E-Bid data may need to be re-entered.

Projectdog.com server time is set to industry standards at time-a.nist.gov. Bidders are encouraged to update their computer clock.

Bidders may save, submit or modify an Electronic Bid (E-Bid) at any time prior to bid close. Once submitted, a bid cannot be edited. To modify a bid the bidder must retract the bid, make any necessary changes, and then submit the bid again. Upon submitting or retracting the bidder will receive a convenience email for informational purposes only. Bidders are encouraged to contact Projectdog if an email is not received.

It is the bidder's responsibility to review and confirm online that a bid has been submitted and/or retracted and that the bid is 100% true, complete and accurate. All bidders are required to review their submitted E-Bid via the "View My Bid Package" link.

If a bid is submitted prior to an addendum being issued the bidder will receive an automated email for informational purposes only stating the bidder must review the addendum, retract the bid, acknowledge all addenda, and submit the bid again. If a bidder fails to acknowledge addenda their bid may be rejected by the Awarding Authority.

Once the bid deadline has closed the E-Bid links are no longer available. All E-Bids are compiled in real time upon bid close and published forthwith on the "Project Details" page titled as "List of Bids Received". Official bid tabulations are posted at the discretion of the Awarding Authority.

For additional assistance, call Projectdog at (978) 499-9014 (M-F, 9AM-5PM).

Bid Bond Affidavit

This document is an affidavit form that is drafted to serve as a statement wherein the person (Bidder) who signs it swears under penalty of perjury that the facts and information that are identified in this affidavit are true. **This affidavit is in lieu of an insurance Bid Bond certificate.**

Bidders submitting the Bid Bond Affidavit form and the 5% Bid Deposit in the form of cash, certified check, treasurer's or cashier's check issued by a responsible bank or trust company shall ensure that these documents are received by the Awarding Authority prior to the closing of the electronic bid.

Both the completed Bid Bond Affidavit form and the Bid Deposit shall be enclosed in a sealed envelope with the following information plainly marked on the outside:

DO NOT OPEN BEFORE: *[indicate DATE and TIME of bid opening]*

Project Name: _____
Project Number: _____
Bidder's Name: _____
Business Address: _____
Phone Number: _____

It is the Bidder's responsibility to ensure that the completed Bid Bond Affidavit form and Bid Deposit are submitted as stated above and received by the Awarding Authority prior to the closing of electronic bids. The completed Bid Bond Affidavit form must also be uploaded via the project E-bid "Bid Bond" link at www.Projectdog.com.

The Bidder understands and consents that any failure to do so whether his own or other fault may result in the rejection of said bid. The Bidder is solely responsible for the accuracy and value of the Bid Deposit. In the event that the Bid Deposit is less than the required amount as outlined in the project specifications the bid may be rejected.

Bid Deposit Amount (in figures): _____

☐ **CASH**

or

☐ **Certified, Treasurer's, or Cashier's Check**

Date: _____

Bidder's Name: _____

Business Address: _____

Signature: _____

SECTION 00.21.13

INSTRUCTIONS TO BIDDERS

2.1 – RECEIPT AND OPENING OF BIDS

This project is being Electronically Bid (E-Bid). All bids shall be prepared and submitted online at www.Projectdog.com. Hard copy bids will not be accepted by the Awarding Authority. For E-Bid Tutorial and Instructions, see pages following this section. For assistance, contact Projectdog, Inc. at 978.499.9014.

Bids Shall include the following documents:

1. General Bid Form or Filed Sub-Bid Form, as appropriate.
2. Bid Bond.
3. DCAMM Certification for category of work being bid, with current Update Statement.

2.2 – LOCATION AND WORK TO BE DONE

This work includes the replacement of oil-fired boilers with gas-fired boilers and related heating equipment wot at the Swanson Road Intermediate School located at 10 Swanson Rd, Auburn, MA 01501.

2.3 – CONTRACT DOCUMENTS

The Drawings and Contract Specifications, INFORMATION FOR BIDDERS, SPECIAL CONDITIONS, GENERAL AND DETAIL SPECIFICATIONS AND FORM FOR BID, AGREEMENT and BONDS are included in the Project Manual.

2.4 – DEPOSIT ON DRAWINGS AND DOCUMENTS

Not required. Electronic versions of documents are available for free at www.projectdog.com.

2.5 – BID SECURITY

Each bid submitted must be accompanied by a Bid Deposit in the form of a Certified, Treasurer's or Cashier's Check, or Bid Bond, drawn on or issued by a responsible Bank, Trust or Surety Company Authorized to conduct business within the Commonwealth of Massachusetts, and payable to the order of the Auburn School District. The Bid Deposit shall be in the sum of five (5) percent of the total bid amount and shall be enclosed in the sealed envelope containing the Bid.

Each such Deposit may be held by the Owner as security for the fulfillment of the Bidder's agreements as hereinabove set forth and as set forth in the BID. Should the bidder fail to fulfill such agreements, his Bid Deposit shall become the property of the Owner as liquidated damages; otherwise, the Bid Deposit shall be returned to the bidder as hereinafter provided.

The Bid Deposit will be returned to all except the three lowest bidders within seven days, Sundays and legal holidays excluded, after the Owner and the accepted bidder have executed the AGREEMENT. In the event that the AGREEMENT has not been executed by both the accepted bidder and the Owner within 30 consecutive calendar days after the opening of Bids, the bid check will be returned promptly upon demand of any bidder who has not been notified of the acceptance.

Bid Deposit, accompanying Bids which are rejected, will be returned within three (3) days, Sundays and legal holidays excluded, after rejection.

None of the three lowest Bids shall be deemed "rejected", notwithstanding acceptance of any BID, until after the AGREEMENT has been executed by both the Owner and the accepted bidder.

2.6 – AWARD OF CONTRACT AND TIME FOR COMPLETION

The work to be performed will remove the heating and domestic hot water system from the building, and it is critically important that functionality be restored as soon as possible. It is expected that the permitting and submittal phases will take place immediately upon execution of a contract and issuance of a Notice to Proceed. Construction milestones include:

1. June 31, 2023 – bid received.
2. June 14, 2023 – anticipated contract date.
3. June 20, 2023 – last day of classes.
4. July 12, 2023 – deadline for submittal approval, material orders placed.
5. August 30, 2023 – first day of classes.
6. October 15, 2023 – Final Completion, heat must be functional per State Law.

2.7 – QUESTIONS REGARDING DRAWINGS AND DOCUMENTS

Any and all questions regarding the Drawings, Specifications or Bid shall be directed, in writing by email, to the Project Architect, Steve VanDyke, Nault Architects, Inc. admin@naultarchitects.com. No exceptions.

In general, no answer will be given to prospective bidders in reply to an oral question if the question involves an interpretation of the intent or meaning of the Drawings or other Contract Documents or the equality of use of products or methods other than those designated or described on the Drawings or in the Specifications. All questions submitted in writing three days before the bid opening will be responded to. No questions will be accepted or answered after this time.

Any information given to bidders other than by means of the Drawings and Contract Documents, including Addenda, as described below, is given informally, is considered to be for information to and for the convenience of bidder only and is not guaranteed. The bidder agrees that such information shall not be used as the basis of nor shall the giving of such information entitle the bidder to assert any claim or demand against the Owner or the Engineer on account thereof.

The Owner, acting through its authorized representation, will set forth as Addenda, which shall become a part of the Contract Documents, such questions received as above provided as in his sole judgment are appropriate or necessary and his decision regarding each. At least 48 hours prior to the receipt of Bids, he will send a copy of these Addenda to those prospective bidders known to have taken out sets of the Drawings and other Contract Documents.

2.8 – BIDDERS TO INVESTIGATE

Bidders must satisfy themselves by personal examination of the site of the Work and by such other means as they wish as to the actual conditions there existing, the character and requirements of the Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in the Bid.

Examination of the site of the work shall be in accordance with regulations as may be called for under SPECIAL CONDITIONS.

2.9 – INFORMATION NOT GUARANTEED

Information given on the Drawings or in other 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.

Any subsurface investigations that have been conducted for the project are indicated on the drawings. 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 on the Drawings or on the other 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 Engineer, arising from or by reason of any variance which may exist between the information made available and the actual structures encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

2.10 - BLANK FORM FOR BID

Refer to Section 00.41.13.13 – General Bid Form and 00.41.13.16 – Sub-Bid Form for sample forms. Actual bids will be prepared electronically, through the www.projectdog.com website.

2.11 – WITHDRAWAL OF BIDS

Except as hereinafter in this subsection otherwise expressly provided, once a Bid is submitted and received by the Owner for consideration and comparison with other bids similarly submitted, the bidder agrees that he may not and will not withdraw it within thirty (30) consecutive calendar days after the actual date of the opening of Bids.

Upon proper written request and identification, Bids may be withdrawn only as follows:

1. At any time prior to the designated time for the opening of Bids.

2. Provided the Bid has not theretofore been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his Bid.

Unless a Bid is withdrawn as provided above, the bidder agrees that it shall be deemed open for acceptance until the AGREEMENT has been executed by both parties thereto until the Owner notifies a bidder in writing that his Bid is rejected or that the Owner does not intend to accept it or return his Bid deposit. Notice of Acceptance of a Bid shall not constitute rejection of any other Bid.

2.12 – CONTRACT BONDS

The Bidder whose Bid is accepted agrees to furnish the Contract Bonds in the forms included in this project manual or in a form satisfactory to the Owner and/or the Engineer, each in the sum of the full amount of the Bid and duly executed and acknowledged by the said bidder as Principal and by a surety company authorized to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Owner, as Surety, for the faithful performance of the Contract and payment for labor and materials. The Contractor shall pay the premiums for such bonds. Unless otherwise authorized in writing by the Owner, the full value of the bonds shall remain in effect for the entire time that the project guarantee period is in effect.

2.13 – ABILITY AND EXPERIENCE OF BIDDER

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

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

2.14 - BIDS

The Owner may reject Bids, which in its sole judgment are either, incomplete, conditional, obscure, unbalanced, 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 should it be in the best interest of the Owner to do so.

2.15 – RIGHT TO REJECT BIDS

The Owner reserves the right to reject any or all Bids, should the Owner deem it to be in the best interest of the Owner to do so.

2.16 – EXECUTION OF AGREEMENT

The Bidder whose Bid is accepted will be required and agrees to duly execute the AGREEMENT within 7 calendar days after notification that the AGREEMENT is ready for signature.

2.17 – INSURANCE CERTIFICATES

The Contractor will not be permitted to start any construction work until he has submitted certificates covering all insurances called for under that subsection of the AGREEMENT titled "4.5 Insurance" and any other insurance requirement called for under SPECIAL CONDITIONS.

2.18 – COMPARISON OF BIDS

Bids will be compared on the basis of the total project bid price, unit prices and Contractor's qualifications as stated in Bid.

In the event that there is a discrepancy in the submitted Bid between the totals or unit prices written in words and figures, the prices written in words shall govern.

The Owner agrees to examine and consider each Bid submitted in consideration of the Bidder's agreements, as hereinabove, set forth and as set forth in the BID.

2.19 – REDUCTION IN SCOPE OF WORK

The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work in order to bring the cost within available funds. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any items of the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at any time during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

2.20 – MASSACHUSETTS SALES AND USE TAX

Materials and equipment purchased for permanent installation in the project will be exempt from the Massachusetts Sales and Use Tax. The exemption certificate number will be furnished to the Contractor. Each bidder shall take this exemption into account in calculating his bid for the work.

2.21 – DELAYS BY THE OWNER

Except as otherwise provided by law, the Contractor shall not be entitled to damages on account of any hindrances or delays due to the Owner's inability to obtain any permits, access or easements necessary for completion of all or any part of the work. In said case, the Contractor shall be entitled to an extension of time only in which to complete the work, to be determined by the Engineer.

2.22 – PRE-BID MEETING

The Owner shall hold a "Pre-Bid Meeting" at the time, date and location listed in the Advertisement.

2.23 – PROJECT SCHEDULE / PHASING

No particular phasing is required for this project. The Prime Contractor is in complete controls over how the work will be performed, and is responsible for delivering the project by the dates listed herein and on the AGREEMENT.

2.24 – ADDITIONAL WORK

(a) The Contractor agrees to perform any work related to the Subject Matter of the contract, but not within the scope of the contract and its specifications, upon written order of the Contracting Officer. The payment for such extra work to be made in accordance with whichever of the following plans the Contracting Officer elects:

(i) a price agreed upon between the parties and stipulated in the order for the extra work,
(ii) a price based on the unit prices of the contract;
(iii) a price determined by adding 15% to the reasonable cost of the extra work performed. Such reasonable cost to be determined by the Contracting Officer in accordance with paragraph (b) below.

(b) In computing reasonable cost for the purpose of (iii) above, the Contracting Officer Shall include the reasonable cost to the Contractor of all materials used, of all labor, common and skilled, of foremen, trucks and the fair rental of all machinery used upon the extra work for the period of such use. If the extra work requires the use of machinery not upon the work or to be used upon the work, then the cost of transportation of such machinery to and from the work shall be added to the fair rental, but said transportation shall not cover a distance exceeding 100 miles. The Contracting Officer shall include in the cost of extra work the cost to the Contractor of any additional insurance that may be required covering public liability and bodily injuries to his employees engaged in the extra work, and the cost of Social Security or other direct assessment upon the Contractor's payroll by Federal or other properly authorized public agencies. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor or his superintendent, or any allowance for use of capital or the premium on the bond as assessed upon the amount of extra work, these items considered as being covered by the fifteen percent (15%) added to the reasonable cost.

(c) The Contracting Officer may make alterations in the line, grade, plan, form, Dimensions, or materials of the Subject matter of the contract, or any part thereof, either before or after commencement of construction. Where such alterations increase the quantity or standard of the work to be done, payment for such increase shall be made in the same way that payment is made for extra work under (a) and (b) above. Where such alterations diminish the quantity or standard of the work to be done, an adjustment shall be made to the benefit of the Town, based upon the unit prices where used or, where unit prices are not used, as the Contracting Officer shall determine.

END OF SECTION

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SECTION 00.41.13.13

GENERAL BID FORM

To the Awarding Authority:

A. The Undersigned proposes to furnish all labor and materials required for the **Swanson Road Intermediate School Boiler Conversion**, Massachusetts, in accordance with the accompanying plans and specifications prepared by **Nault Architects, Inc.** (name of architect or engineer) for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

B. This bid includes addenda numbered _____

C. The proposed contract price is _____ dollars ($_____).

For alternate No. _____ Add $_____ ; Subtract $_____

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

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

$_____

Item 2. Sub-bids as follows:

Sub-trade	Name of Sub-bidder	Amount	Bonds required, "Yes" or "No"
Plumbing	_____	$_____	_____
Electrical	_____	$_____	_____
	Total of Item 2	$_____	

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

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

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; provided, however, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health

Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A.

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

Date _____

_____
(Name of General Bidder)

By_____
(Name of Person Signing Bid and Title)

_____
(Business Address)

_____
(City and State)

END OF SECTION

SECTION 00.41.13.16

SUB-BID FORM

To all General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section No. _____ of the specifications and in any plans specified in such section, prepared by _____ Nault Architects, Inc. for _____ (project) in _____ (city or town), Massachusetts, for the contract sum of _____ dollars ($_____).

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

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except:

_____

☐ may only be used by the following general bidders:

_____

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

D. The undersigned agrees that, if he is selected as a sub-bidder, he will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by the general bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

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

Name	Class of Work	Bid price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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

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

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

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

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

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

4. Bank reference _____

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

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

Date_____

_____
(Name of Sub-bidder)

By _____
(Title and Name of Person Signing Bid)

_____
(Business Address)

_____
(City and State)

END OF SECTION

SECTION 00.43.13

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we,

_____

as Principal, hereinafter called the Principal, a ☐ corporation ☐ partnership ☐ individual duly authorized by law to do business as a construction contractor in the Commonwealth of Massachusetts, and

_____
(Surety Company name)

a corporation duly authorized to do a surety business under the Laws of the Commonwealth of Massachusetts as Surety, hereinafter called the Surety, are held and firmly bounds unto the Awarding Authority as Obligee, hereinafter called the Obligee, in the penal sum of

_____ Dollars $_____

OR

Five Percent (5%) of the bid

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the principal has submitted a bid for the project named:

_____

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee 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.

Signed and sealed this _____ day of _____ 20_____

_____
Principal

_____
Signature

_____
Print or type name signed above

_____
Title

_____
Surety Seal

_____
Signature

_____
Print or type name signed above

END OF SECTION

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SECTION 00.52.13

AGREEMENT

THIS AGREEMENT, executed this _____day of _____, in the year Two Thousand Twenty-three (2023) (herein referred to as the "AGREEMENT"), by and between the Auburn School District, Auburn Massachusetts, acting by and through its School Board, duly authorized therefore, who act herein solely for said District and without personal liability to themselves, party of the first part, and

(Contractor) _____,

doing usual business at (address) _____,

_____,
party of second part.

WITNESSETH, that the parties to these presents, each in consideration of the undertakings, promises, and agreements on the part of the other herein contained have undertaken, promised, and agreed and do hereby undertake, promise and agree, the party of the first part for itself, its successors and assigns, and the party of the second part for himself and his heirs, executors, administrators, successors and assigns as follows:

4.1 – THE CONTRACT DOCUMENTS

The Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of the SPECIAL CONDITIONS and the provisions of any of the other Contract Documents, the provisions of the SPECIAL CONDITIONS shall prevail. In the event of conflict or inconsistency between the provisions of the AGREEMENT and the provisions of the Contract Documents other than the SPECIAL CONDITIONS, the provisions of the AGREEMENT shall prevail.

This contract is executed after invitations for bids have been asked for by publication in the CENTRAL REGISTER and the WORCESTER TELEGRAM AND GAZETTE and on the website COMMBUYS.COM.

4.2 – AUTHORITY OF THE ARCHITECT

The Architect shall be the sole judge of the intent and meaning of the Drawings and Specifications and his/her decisions thereon and his/her interpretation thereof shall be final, conclusive and binding on all parties.

The Architect shall be the Owner's representative during the life of the Contract and he/she shall observe the Work in progress on behalf of the Owner. He/she shall have authority (1) to act on behalf of the Owner to the extent expressly provided in the Contract or otherwise in writing; (2) to stop the Work whenever such stoppage may be necessary in his/her sole discretion, to prevent improper execution of the Work or otherwise to protect the interests of the Owner; (3) to approve and direct the sequence of execution and general conduct of the Work and to direct that changes be made in such sequence where, in his sole discretion, public necessity or welfare, the interest of the Owner or the progress of the Work shall require, such approval or direction shall, however, in no way relieve or diminish the responsibility of the Contractor for or in the conduct of the Work; (4) to determine the amount, quality, acceptability and fitness of all work, materials and equipment required by the Contract' and (5) to decide all questions which arise in relation to the Work, the execution thereof and the fulfillment of the Contract.

The Contractor shall proceed without delay to perform the Work as directed, instructed, determined or decided by the Architect and shall comply promptly with such directions, instructions, determinations or decisions. If the Contractor has any objection thereto, he may require that any such direction, instruction, determination or decision be put in writing, and within ten (10) days after receipt of such writing, he may file a written protest with the Owner stating clearly and in detail, his objections, the reasons therefore, and the nature and amount of additional

compensation, if any, to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Architect at the same time it is filed with the Owner.

Unless the Contractor files such written protest with the Owner and Architect within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination or decision, and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instruction, determination or decision as being fair, reasonable and finally determinative of his obligations and rights under the Contract.

4.3 – OBLIGATIONS AND LIABILITY OF CONTRACTOR

The Contractor shall do all the Work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies, and all other things (except as otherwise expressly provided therein) necessary and as herein specified for the proper performance and completion of the work in the manner and within the time hereinafter specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the Architects, and at the prices herein agreed therefore.

All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the Work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

The Contractor shall coordinate his operation with those of any other Contractors who may be employed on other work of the Owner, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precautions as may be necessary to protect life and property.

The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and acceptance thereof. He shall in no way be relieved of his responsibility by any right of the Architects to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the Architects to give such permission or directions.

The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes. The Contractor shall indemnify, defend and save harmless, the Owner and his officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees and expenses, on account of bodily injury, sickness, disease or death sustained by any person or persons, or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to, or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, the Owner, or any of his respective officers, agents, servants or employees and/or any person or persons, and whether or not such claims, demands, suits or proceedings, provided, however, that the Contractor shall not be required to indemnify the Architects, his/her officers, agents, servants or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or specifications prepared, acquired or used by the Architects and/or solely by the negligence or fault of the Architects.

The Contractor shall conduct his operations so as not to damage existing structures of work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as

new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor or any such other contractor, the Contractor shall have no claim against the Owner therefore, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage. The Contractor agrees to and does hereby indemnify and save harmless, the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay, and from and against any all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees and expenses arising out of, relating to, or resulting from such claims.

The Contractor shall promptly pay all Federal, State and Local taxes, which may be assessed against him in connection with the Work or his operations under the AGREEMENT and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work, unless specified otherwise in SECTION 2: Information for Bidders, or in SECTION 7: Special Conditions, of the Contract Documents.

4.4 – SUPERVISION OF WORK

The Contractor shall give the Work the constant attention necessary to ensure the expeditious and orderly progress thereof and shall cooperate with the Architects in every possible way.

Whenever the Contractor is not present on any part of the Work, a competent assistant shall be placed in charge with the authority to act for the Contractor. Said assistant(s) shall be able to receive directions or instructions that may be given by the Architects. Superintendents shall be licensed consistent with the Massachusetts State Building Code.

Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such Work, such directions or instructions may be given by the Architects to, and shall be received and obeyed by, the foreman or any other person in charge of the particular work involved. Likewise, said Foreman or person shall be able to receive directions or instructions.

4.5 – INSURANCE

Before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the CONTRACT, the Contractor shall procure and maintain insurance of types specified in paragraphs (a) to (g), inclusive below, and to the limits for this insurance specified under SPECIAL CONDITIONS. All insurance shall be obtained from companies authorized to conduct business within the Commonwealth of Massachusetts and satisfactory to the Owner.

Insurance shall be in such form as will protect the Contractor from all claims for liability for damages for bodily injury, including accidental death, and for property damage which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

The following types of insurance shall be provided (see Section 00.73.00, Item 15 for limits):

(a) Workman's Compensation and Employer's Liability Insurance.

(b) Bodily Injury Insurance for Operations and Completed Operations and Contractor's Protective Bodily Injury Insurance.

(c) Property Damage Insurance for Operations and Completed Operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to, or destruction of wires or pipes and similar property and appurtenant apparatus, and the collapse of, or structural injury to, any building or structure except those on which under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.

(d) Bodily Injury Insurance covering the operation of all motor vehicles by the Contractor.

(e) Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.

(f) Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, which such vehicles are being operated in connection with the prosecution of the Work; and,

(g) Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this AGREEMENT.

All policies shall be so written that the Owner will be notified in writing of cancellation or restrictive amendment at least thirty (30) days prior to the effective date of such cancellation or amendment.

Certificates from the Contractor's insurance carriers stating the coverage provided, the limits of liability, and expiration dates shall be filed in triplicate with the Architects before operations are begun. Such certificates shall be on the form satisfactory to the Architects.

Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

The Contractor shall also furnish such other insurance as may be called for by the SPECIAL CONDITIONS.

No insurances required or furnished hereunder shall in any way relieve the Contractor of, or diminish any of his responsibilities, obligations and liabilities under the Contract.

4.6 – PATENTS

The Contractor shall indemnify and save harmless, the Owner and all persons acting for, or on behalf of, the Owner from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorneys' fees, arising from, or occasioned by, an infringement or alleged infringement of any patents or patent rights on any invention, process, material, equipment, article, or apparatus, or any part thereof, furnished and installed by the Contractor, or arising from, or occasioned by, the use or manufacture thereof, including their use by the Owner.

4.7 – COMPLIANCE WITH LAWS

The Contractor shall keep himself fully informed of all existing and future Federal, State and Local laws, ordinances, rules and regulations affecting those engaged or employed on the Work, the materials and equipment used in the Work or the conduct of the Work, and of all orders, decrees and other requirements of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Architects in writing. The Contractor shall at all times observe and comply with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless, the Owner, its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, penalties, losses, damages, costs and expenses, including reasonable attorneys' fees and expenses arising from, or based upon any violation or claimed violation of any such law, ordinance, rule,

regulations, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

4.8 – PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in the Contract, shall be deemed to be inserted herein under the applicable subsection of Section 7, Special Conditions, and the Contract shall be read and enforced as though they were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

4.9 – PERMITS

The Contractor shall, unless indicated otherwise in the SPECIAL CONDITIONS Section of the Contract Documents, comply with all necessary permits from the county, municipal, or other public authorities; shall give all notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work. Costs for permits will be waived by the Town.

4.10 – NOT TO SUBLET OR ASSIGN

The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Owner, and shall not assign any of the monies payable under the Contract or his claim thereto, unless by, and with, the like written consent of the Owner and the Surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

4.11 – EMPLOY COMPETENT PERSONS

The Contractor shall employ only competent persons on the Work and shall not employ persons or means which may cause strikes, work stop-pages or any disturbances by workmen employed by the Contractor, any subcontractor, the Architects, or any other contractor. Whenever the Owner notifies the Contractor in writing that in his/her opinion, any person on the Work is incompetent, unfaithful, or disorderly, or otherwise unsatisfactory or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Architects.

4.12 – EMPLOY SUFFICIENT LABOR AND EQUIPMENT

If in the sole judgment of the Owner, the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Architects may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Architects deems necessary to enable the Work to progress properly.

4.13 – INTOXICATING LIQUORS/ILLICIT DRUGS

The Contractor shall not sell and shall neither permit nor suffer the introduction or use of intoxicating liquors or illicit drugs or substances upon or about the Work.

4.14 – PROTECTION AGAINST WATER AND STORM

The Contractor shall take all precautions necessary to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor shall, at his own cost and expense, make such repairs or replacements or rebuild such parts of the Work as the Architects may require, in order that the finished Work may be completed as required by the Contract.

The Owner may suspend the performance of any work at any time, when, in his/her judgment, the conditions are not suitable or the proper precautions are not being taken, whatever the weather may be, in any season. The Contractor

agrees that he shall not have or assert any claim or be entitled to any additional compensation or damages on account of any such suspension.

4.15 – CLEANING UP

The Contractor, at all times, shall keep the site of the Work free from rubbish and debris caused by his operations under the Contract. When the Work has been completed, the Contractor shall remove from the site of the Work all of his plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the Work and the site clean and ready for use.

4.16 – LEGAL ADDRESS OF CONTRACTOR

The Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter notice or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery of either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient services thereof upon the Contractor, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the Owner. Service of any notice, letter or other communication upon the Contractor personally shall likewise be deemed sufficient service.

4.17 – MISTAKES OF CONTRACTOR

The Contractor shall promptly correct and make good any and all defects, damages, omissions or mistakes for which he and/or his agents, servants, employees or subcontractors are responsible, and he shall pay to the Owner all costs, expenses, losses and damages resulting there from, or by reason thereof, as determined by the Architect.

4.18 – RIGHT TO MATERIALS

Nothing in the Contract shall be constructed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the Work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Owner.

4.19 – NIGHT, SUNDAY AND HOLIDAY WORK

Work on site and within the building will be permitted during other than regular hours, at the Contractor's discretion. Access to the building shall be coordinated through the Owner, and sufficient advanced notice given.

No additional compensation shall be paid for off-hours work. Contractors should budget and bid the time required to complete the scope of work within the deadlines stated herein and include such costs in the bids.

4.20 – TIME FOR COMPLETION

The rate of progress shall be such that the Work shall be performed and completed in accordance with the Contract before the expiration of the time limit stipulated under Section 00.21.13 – Instructions to Bidders, except as otherwise expressly provided herein.

It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given for ordinary or foreseeable delays, inclement weather or accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the Work within the stipulated time limit.

If delays are caused by acts of God, acts of Government, unavoidable strikes, extra work, or other causes of contingencies clearly beyond the control of responsibility of the Contractor, the Contractor shall be entitled to so

much additional time to perform and complete the Work as the Architects shall certify in writing to be just*. The Contractor agrees that he shall not have or asset any claim for, nor shall he be entitled to any additional compensation or damages on account of such delays.

The time in which the Work is to be performed and completed is of the essence in the AGREEMENT.

*This paragraph will be interpreted to include delays in receipt of equipment provided that the Contractor placed his order and submitted shop drawings for such equipment promptly after execution of the Contract, that he has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.

4.21 – LIQUIDATED DAMAGES

In case the Contractor fails to complete the Work satisfactorily on or before the date of completion fixed herein or as duly extended by written certification of the Architects, the Contractor agrees that the Owner shall deduct from the payments due the Contractor each month, the sum set forth under the SPECIAL CONDITIONS for each calendar day of delay, which sum is agreed upon not as a penalty but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other monies due or to become due the Contractor, and, in case such damages shall exceed the amount of all monies due or to become due the Contractor, the Contractor or his Surety shall pay the balance to the Owner.

4.22 – ACCESS TO WORK

The Owner, and his officers, agents, servants and employees may at any and all times, and for any and all purposes, enter upon the work and the site thereof and the premises used by the contractor, and the Contractor shall at all times provide safe and proper facilities therefore.

4.23 – EXAMINATION OF WORK

The Architects shall be furnished by the Contractor with every reasonable facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of requiring the uncovering or taking down portions of finished work by the Contractor.

Should the Work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the Contract in point of time or in the absence of the Architects or his inspector and without his written authorization, in which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise be borne by the Contractor.

4.24 – DEFECTIVE WORK

The inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract. Defective work shall be corrected and unsuitable materials, equipment, apparatus and other items shall be replaced by the Contractor, notwithstanding that such work, materials, equipment apparatus and other items may have been previously overlooked or accepted or estimated for payment. If the Work or any part thereof shall be found defective at any time before the final acceptance of the Work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Architects; if any material, equipment, apparatus or other items brought upon the site for use or incorporation in the Work, or selected for the same, is condemned by the Architects as unsuitable or not in conformity with the specifications or any of the other Contract Documents, the Contractor shall forthwith remove such material, equipment apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Owner which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

4.25 – CHANGES

The Owner, through the Architect, may make changes in the Work and in the Drawings and Specification therefore by making alterations therein, additions thereto or omissions there from. All work resulting from such changes shall be performed and furnished under and pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities therefore at the unit prices stipulated in the Contract for such Work, except that if unit prices are not stipulated for such Work, compensation for additional or increased work shall be made as provided hereinafter under the subsection titled "Extra Work", and for eliminated or decreased work, the Contractor shall allow the Owner a reasonable credit as determined by the Architect.

Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Architects authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

4.26 – EXTRA WORK

The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Architects, at the unit prices stipulated in the Contract for such work or, if none are so stipulated, either (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Architects so elects, for the reasonable cost of such work, as determined by the Contractor and approved by the Architects, plus a percentage of such cost, as set forth below. No extra work shall be paid for unless specifically ordered as such in writing by the Architects.

The cost of extra work done under (b) above shall include the reasonable cost to the Contractor of materials used and equipment installed, common and skilled labor and foremen, and the fair rental of all machinery and equipment used on the extra work for the period of such use.

At the request of the Architects, the Contractor shall furnish itemized statements of the cost of the extra work ordered as above and give the Architects access to all records, bills, vouchers and correspondence relating thereto.

The Contractor may include in the cost of extra work, the amounts of additional premiums, if any (other than premiums non bonds) paid on the required insurance on account of such extra work, of Social Security or other direct assessments upon the Contractor's payroll by Federal or other properly authorized public agencies, and of other approved assessments when such assessments are not normally included in payments made by the Contractor directly to his employees, but in fact are, and are customarily recognized as, part of the cost of doing work.

The fair rental for all machinery and equipment shall be based upon the most recent edition of "Compilation of Rental Rates for Construction Equipment", published by the Associated Equipment Distributors, or a similar publication approved by the Architects, rental for machinery and equipment shall be based upon an appropriate fraction of the approved monthly rate schedule. If said extra work requires the use of machinery or equipment not already on the site of the Work the cost of transportation, not exceeding a distance of 100 miles, of such machinery or equipment to and from the Work shall be added to the fair monthly rental; provided, however that this shall not apply to machinery or equipment already required to be furnished under the terms of the Contract.

The Contractor shall not include in the cost of extra work any cost or rental of small tools, building or any portion of the time of the Contractor, his superintendent, or his office and Architects staff.

To the cost of extra work done by the Contractor's own offices under (b) above (determined as stated above), the Contractor shall add fifteen (15) percent to cover his overhead, use of capital, the premium on the Bonds as assessed upon the amount of this extra work and profit.

In the case of extra work done under (b) above by a subcontractor, the subcontractor shall compute, as above, his cost for the extra work, to which he shall add fifteen (15) percent as in the case of the Contractor, and the Contractor

shall be allowed and additional five (5) percent of the subcontractor's cost for the extra work to cover the costs of the Contractor's overhead, use of capital, the premium on the Bonds as assessed upon the amount of this extra work and profit. Said subcontractor's cost must be reasonable and approved by the Architects.

If extra work is done under (b) above, the Contractor and/or subcontractor shall keep daily records of such extra work. The daily record shall include the names of men employed, the nature of the work performed, hours worked, materials and equipment incorporated, and machinery or equipment used, if any, in the prosecution of such extra work. This daily record, to constitute verification that the work was done, must be signed both by the Contractor's authorized representative and by the Architects. A separate daily record shall be submitted for each extra work order.

4.27 – EXTENSION OF TIME ON ACCOUNT OF EXTRA WORK

When extra work is ordered near the completion of the Contract or at any time during the progress of the Work, which in the sole judgment of the Architects unavoidably increases the time for the completion of the Work, an extension of time shall be granted as hereinbefore provided.

4.28 – CHANGES NOT TO AFFECT BONDS

It is distinctly agreed and understood that any changes made in the Work or the Drawings or Specifications therefore (whether such changed in increase or decrease the amount thereof the time required for its performance) or any changes in the manner or time of payments made by the Owner to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the Surety on the CONTRACT BONDS given by the Contractor, it being the intent hereof that notwithstanding such changes, the liability of the Surety on said bonds continue and remain in full force and effect.

4.29 – CLAIMS FOR DAMAGES

If the Contractor makes claim for any damages alleged to have been sustained by breach of contract of otherwise, he shall, within ten (10) day after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file with the Architects a written, itemized statement in triplicate of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such statement is made and filed as so required, his claim for damages shall be deemed waiver, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days upon its receipt, the Architects will furnish his recommendations for action by the Owner.

The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction, instruction, determination or decision of the Architects, nor shall any such claim be considered, unless the Contractor shall have complied in all respects with the third paragraph of that subsection above of this AGREEMENT titled "Authority of the Architects", including, but not limited to, the filing of a written protest in the manner and within the time therein provided.

4.30 – ABANDONMENT OF WORK OR OTHER DEFAULT

If the work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Owner, or the Contract or any monies payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Architects shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Owner may notify the Contractor in writing, with a copy of such notice mailed to the Surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Owner may designate; and the Owner may, upon giving such notice, by contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and

expense of so completing the Work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the Work, the Owner shall be entitled to costs and expenses, including attorneys' fees, sustained or incurred by the Owner by reason of any of the foregoing causes. For the purposes of such completion, the Owner may for itself or for any contractors employed by the Owner, take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

All costs, expenses, losses, damages, reasonable attorneys' fees and expenses, and any and all other charges incurred by the Owner under this subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any monies due or payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor, the Owner shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefore to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorneys' fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference, and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

4.31 – PRICES FOR WORK

The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

4.32 – MONIES MAY BE RETAINED

The Owner may at any time retain from any monies which would otherwise be payable hereunder so much thereof as the owner may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder or as otherwise indicated herein.

4.33 – USE OR PARTIAL PAYMENT NOT ACCEPTED

It is agreed that this is an entire Contract for one whole and complete Work or result and that neither the Owner's entrance upon or use of the work or any part thereof nor any partial payments by the Owner shall constitute an acceptance of the Work or any part thereof before its entire completion and final acceptance.

4.34 – PROGRESS ESTIMATES

Once a month, except as hereinafter provided, the Architects shall verify an estimate in writing of the total amount and value of the Work done to the first of the month by the Contractor. The Owner shall retain a percentage of such estimated value, as set forth under SPECIAL CONDITIONS, as part security for fulfillment of the Contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the Contract. The Owner shall pay monthly to the Contractor the balance not deducted and/or retained as aforesaid, except that payment may be withheld at any time, if in the judgment of the Architects, the Work is not proceeding in accordance with the Contract. If the Owner deems it expedient to do so, it may cause estimates and payment to be made more frequently than once in each month.

No progress estimate or payment need be made when, in the judgment of the Architects, the total value of the Work done since the last estimate amounts to less than the amount set forth under SPECIAL CONDITIONS.

Estimates of lump sum items shall be based on a schedule dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities

will equal the Contract price for the item. This schedule shall be submitted by the Contractor for and must have the approval of the Architects before the first estimate becomes due.

If the Architects determines that the progress of the Work will be benefited by the delivery to the site of certain materials and equipment, when available, in advance of actual requirement, therefore, and if such materials, and equipment are delivered and properly stored and protected, the cost to the Contractor or subcontractor as established by invoices or other suitable vouchers satisfactory to the Architects, less the retained percentage as above provided, may be included in the progress estimates; provided always that they be duly executed and delivered by the Contractor to the Architects at the same time a Bill of Sale in form satisfactory to the Owner, transferring and assigning to the Owner full ownership and title to such materials or equipment.

4.35 – SUBSTANTIAL COMPLETION, FINAL ESTIMATE AND PAYMENT

Substantial completion shall mean either that the work required by the contract has been completed except for work having a contract price of less than one percent of the adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

Within seven (7) days, the Architects shall respond in writing to the Contractor either acknowledging such certification or presenting an itemized list of incomplete or unsatisfactory work items required by the Contract sufficient to demonstrate that the Work has not been substantially completed.

The Architects shall submit for approval to the Contractor a substantial completion estimate and all but one (1) percent retainage on the Work, including all but one (1) percent retainage for the undisputed portion of any item in dispute, less the estimated cost of completing such satisfactory Work items and the total periodic payments made to date.

Within seven (7) days of the effective date of declaration of substantial completion, the Architects shall send to the Contractor a list of all incomplete or unsatisfactory Work items. Unless delayed by causes beyond his control, the Contractor shall complete all such Work items before the Contract completion date. The final payment for work done under this contract shall be made only after the CONTRACTOR has signed a statement, under the penalty of perjury, certifying that the Work described in this contract has been completed by him. This includes all punch list items that may exist after substantial completion.

Within seven (7) days of notice from the Contractor that all Work required by the Contract has been completed, if acknowledged, the Architects shall submit for approval to the Contractor a final estimate for the quantity and price of the Work done and all retainage on the Work less the total periodic payments made to date. Within thirty-five (35) days of receipt of written acceptance of such estimate, the Owner shall pay the amount due.

4.36 – LIENS

If at any time any notices of lien are filed for the labor performed or materials or equipment manufactured, furnished or delivered to or for the Work, the Contractor shall, at his own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any monies payable hereunder an amount which, in its sole judgment, it deems necessary to satisfy such liens and pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

4.37 – CLAIMS

If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any monies which would otherwise be payable hereunder so much thereof as, in its sole judgment, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

4.38 – APPLICATION OF MONIES RETAINED

The Owner may apply any monies retained hereunder to reimburse itself for any and all costs, expenses, losses, damages, liabilities, suits, judgments and awards incurred, suffered or sustained by the Owner and chargeable to the Contractor hereunder or as determined hereunder.

4.39 – NO WAIVER

Neither the inspection by the Owner or the Architects nor any order measurement approval, determination, decision or certificate by the Architects, nor any order by the Owner, for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the Work by the Owner, nor any extension of time, nor any other act or omission of the Owner or the Architects shall constitute or be deemed to be an acceptance of any defective or improper work materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Owner, nor of any right to damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and in addition to each and every other right and remedy provided for herein or by law, the Owner shall be entitled as of right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by his subcontractors or by any other person or persons.

4.40 – LIABILITY OF OWNER

No person, firm or corporation, other than the Contractor, who signed this Contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Owner or any agent of the Owner and neither the Owner nor any agent of the Owner shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Owner and of every agent of the Owner of and from any and all claims, demands, damages and liabilities of, by or the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any other person, arising out of, relating to or by reason of the Work, except the claim against the Owner for the unpaid balance, if any there be, of the amounts retained as herein provided.

4.41 – ARBITRATION

Any controversy or claim arising out of or relating to this contract or the breach thereof shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof. Any waiver of arbitration shall be only by the expressed written consent of both parties. Waiver shall not be implied by any action of the parties. The Contractor shall carry on and maintain the progress of the Work during arbitration proceedings, unless otherwise mutually agreed in writing by the parties hereto.

4.42 – GUARANTEE

The Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed n the construction of the same, shall be free from defects and flaws and shall be performed and furnished in strict accordance with the Drawings, Specifications and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirement of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If during the guarantee period, any part of such Work requires replacing, correcting or repairing, or damage to other property of the Owner is caused by any defect in the Work, the Owner may notify the Contractor in person or by mail to make the required repairs, corrections or replacements. If the Contractor neglects to make such repairs, corrections or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, the Owner may employ other persons to make the same. The Contractor agrees, upon demand, to pay to the

Owner all amounts, which it expends for such repairs, corrections or replacements, including compensation for additional professional services.

4.43– RETAIN MONEY FOR REPAIRS

The Owner may retain out of the monies otherwise payable to the Contractor hereunder a percentage of the amount thereof as set forth under SPECIAL CONDITIONS, and may expend the same, in the manner hereinafter provided in making such repairs, corrections or replacements in the Work as the Owner, in its sole judgment, may deem necessary.

4.44 – RETURN OF DRAWINGS

All Drawings furnished by the Owner or the Architects to the Contractor may be used only in connection with the prosecution of the Work and shall be returned by the Contractor upon completion of the Work.

4.45 – HEADINGS

The headings or titles of any sections, subsections, paragraphs, provisions or part of the Contract Documents shall not be deemed to limit or restrict the content, meaning or effect of such section, subsection, paragraph, provision or part.

4.46 – TERMINATION, SUSPENSION OR DELAY

A. Termination for Cause. The SCHOOL DISTRICT may terminate this contract for cause by written notice, in accordance with Article 14C, if it determines that any of the following circumstances have occurred.

1.The CONTRACTOR is adjudged bankrupt of has made a general assignment for the benefit of its creditors.

2.A receiver has been appointed of the CONTRACTOR'S property.

3.All or a part of the Work has been abandoned.

4.The CONTRACTOR has sublet or assigned all or any portion of the Work, the Contract, or declaims there under, without the prior written consent of the DISTRICT, except as provided in the Contract.

5.The Architects or the DISTRICT has determined that the rate of progress required on the project is not being met; or

6.The CONTRACTOR has not substantially reached any provisions of this Contract.

In the event of such termination, the DISTRICT may hold the CONTRACTOR and its sureties liable in damages as for a breach of contract, and/or the DISTRICT may notify the CONTRACTOR to discontinue all work, or any part thereof, and the CONTRACTOR shall all work, or any part thereof, as the DISTRICT may designate.

The District may complete the work, or any part thereof, and charge the expense of completing the Work of part thereof, to the CONTRACTOR.

The DISTRICT may take possession of and use any materials, machinery, implements and tools found upon the site of said Work. The DISTRICT shall not be liable for any depreciation, loss or damage to said materials, machinery, implements or tools during said use and the CONTRACTOR shall be solely responsible for their removal from the Project site after the DISTRICT has no further use for them.
The DISTRICT may, at its option, require the surety or sureties to complete the Contract.

B. Termination Liabilities. All expenses charged under Paragraph A shall be deducted and paid by the DISTRICT out of any monies then due or to become due the CONTRACTOR under this Contract; and in such

accounting the DISTRICT shall not be held to obtain the lowest figures, by competitive bid or otherwise, for the work of completing the Contract or any part thereof. The parties agree that $25,000.00 represents liquidated damages in the event of the breach of this contract by the CONTRACTOR, and said sum will be paid to the DISTRICT by the CONTRACTOR.

All sums actually paid by the DISTRICT to complete the Work shall be charged to the CONTRACTOR. In case the expenses charged are less than the sum, which would have been payable under this Contract if the same had been completed by the CONTRACTOR, the Contractor shall pay the amount of the excess to the DISTRICT.

C. Termination – No Fault. In the event that this Contract is terminated by the DISTRICT, by written notice in accordance with Article 14C., and termination is not based on a reason listed in Paragraph A., the CONTRACTOR shall be compensated for its costs incurred on the Project, including reasonable costs of demobilization, calculated on a percent completion basis, covering the period of time between the last periodic payment and the date of termination.

Payment by the DISTRICT, pursuant to this paragraph shall be considered to fully compensate the CONTRACTOR for all claims and expenses and those of any consultants, subcontractors, and suppliers, directly or indirectly attributable to the termination, including any claims for lost profits.

D. Suspensions and Delays. Should the DISTRICT be prevented or enjoined from proceeding with Work either before or after the start of construction by reason of any litigation or other reason beyond the control of the DISTRICT, the CONTRACTOR shall not be entitled to make or assert claim for damage by reason of said delay but time for completion of the Work will be extended to such reasonable time as the DISTRICT may determine will compensate for time lost by such delay with such determination to be set forth in writing.

Pursuant to G.L. C. 30, S 39(a), the DISTRICT 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 DISTRICT; provided however, that if there is a suspension, delay or interruption for fifteen (15) days or more or due to a failure of the DISTRICT to act within the time specified in this contract, the DISTRICT shall make and 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 for such increase; and provided further, that the DISTRICT 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 provided for an equitable adjustment of the contract price under any other contract provisions.

Pursuant to G.L., C. 30, S 390(b), the General CONTRACTOR must submit the amount of claim under provision (a) to the DISTRICT 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 the costs due to a suspension order, the DISTRICT shall not approve any cost in the claim incurred more than twenty (20) days before the General CONTRACTOR notified the DISTRICT in writing of the act or failure to act involved in the claim.

4.47 – MONIES AVAILABLE TO THE OWNER

Anything hereinbefore set forth to the contrary notwithstanding, nothing in this contract shall be deemed to commit the Owner to pay a sum in excess of monies lawfully appropriated or available to the Owner for such payments.

4.48 – PERSONAL LIABILITY

Neither the School District nor any of their agents, employees or representatives shall be under any personal obligation or liability by reason of this contract, the execution thereof or anything relating thereto.

4.49 – FORCE MAJEURE

Neither the SCHOOL DISTRICT, as acting by and through its Board, nor the vendor shall be deemed in default of this Agreement if the performance of any other respective obligations hereunder is delayed or becomes impossible for any reason, beyond their reasonable control respectively, including, without limitation, war, invasion, act of foreign enemy, hostilities, civil war or rebellion, (whether war be declared or not) strike, lockout or other industrial dispute, or Act of God; provided however, that the part interfered with provided written notice thereof to the other part within ten (10) working days of any such force majeure, condition or event.

4.50 – MISCELLANEOUS

The CONTRACTOR hereby represents and certifies under the pains and penalties of perjury;

A. Organization. The CONTRACTOR is a duly organized and validly existing corporation/partnership/trust/sole proprietorship and is qualified to do business, and is in good standing in the Commonwealth of Massachusetts, with full power and authority to consummate the transactions contemplated hereby.

B. Authority. (Not applicable to sole proprietorships)
This Agreement has been duly executed and delivered on behalf of the CONTRACTOR by its president/treasurer/general partner /trustee/other to and in full compliance with the authority granted by its organization documents and its votes or resolutions, which authority has not been amended, modified or rescinded as of the date hereof. The person executing this Agreement is, as of date hereof, the president/ treasurer/general partner/ trustee/other of the CONTRACTOR.

C. Non –Collusion. The Bid upon which this Agreement was based was made without collusion or fraud with any other person and was in all aspect bona fide and fair. As used in this paragraph, the word, "person", shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

D. Tax and Contribution Compliance. The CONTRACTOR is in full accordance with all laws of the Commonwealth of Massachusetts relating to taxes and to contributors and payment in lieu of contributions.

E. Municipal Taxes and Liens. The CONTRACTOR has paid all real estate, person property or excise tax, water charges, fines and/or any other municipal lien charges due to the DISTRICT.

F. Debarment. The CONTRACTOR certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal or state department or agency.

G. Minimum Wage. The CONTRACTOR shall comply with the requirements of the Massachusetts General Law, Chapter 149, S26 through 30, inclusive, as amended, all of which are hereby incorporation herein by reference, and Minimum Wage Rates and Health and Welfare and Pension Fund Contributors as determined by the Commissioner of Labor and Industries under the provisions of the afore stated statues as applicable.

H. License and Permits. The CONTRACTOR is in possession of all required licenses and permits for any activity, which may occur from the CONTRACTOR'S operation under this Agreement. The CONTRACTOR will submit copies of such licenses and/or permits upon request.

I. Discrimination. It is understood and agreed that it shall be a material breach of any contract resulting from this bid for the CONTRACTOR to engage in any practice, which shall violate any provision of M.G.L. c 151B, relative to discrimination in hiring, discharge, compensation, or terms, conditions or privileges of employment because of age, color, religion, creed, national origin, sex, sexual orientation, age or ancestry.

J. Conflict of Interest. The bidder certifies that no official or employee of the DISTRICT has a financial interest in this quotation or in the contract which the bidder offers to executive or in the expected profits to arise therefrom, unless there has been compliance with provision of M.G.L. c268A, s20 (Conflict of Interest), and that this quotation is made in good faith without fraud or collusion or connection with any other person submitting the quotation.

K. Reference. When reference is made in this Contract to a provision of the General conditions, the Technical Specifications or other Contract Documents, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

L. Terms Required by Law. All terms required by law to be included in this Contract are hereby included and shall be in as full effect as if set forth in full herein.

M. Notice.

1. Any notice required to be given to the CONTRACTOR under the terms of this Agreement shall be in writing and sent by registered or certified mail, postage prepaid, return receipt requested to: _____ or other such address as the CONTRACTOR from time-to-time may have designated by written notice to the DISTRICT and shall be deemed to have been given when mailed by the DISTRICT.

2. Any notice required to be given to the DISTRICT by the CONTRACTOR under the terms of this Agreement shall be in writing and sent by registered or certified mail, postage prepaid, return receipt requested to: Mr. Joseph Fahey, Auburn School District, 5 West Street, Auburn, MA. 01501 or such other address as the DISTRICT from time-to-time designated by written notice to the CONTRACTOR and shall be deemed to have been given when mailed by the DISTRICT.

N. Independent Contractor. CONTRACTOR is not an agent or employee of the DISTRICT and is not authorized to act on behalf of the DISTRICT.

O. Complete Agreement. This Agreement supersedes all prior agreements and understandings between the parties and may not be changed unless mutually agreed upon in writing by both parties.

P. Assignment. CONTRACTOR shall not assign this Agreement, or any interest therein without prior written consent of the DISTRICT.

Q. Subcontractors. CONTRACTOR shall not engage any other company, subcontractor or individual to perform any obligation hereunder, without the prior written consent of the DISTRICT.

R. Governing Law. This Agreement shall be governed by the laws of the Commonwealth of Massachusetts.

S. Enforceability. In the event any provision of this Agreement is found to be legally unenforceable, such unenforceability shall not prevent enforcement of any other provision of the Agreement.

IN WITNESS HEREOF, the parties of this AGREEMENT have hereunto set their hands and seals as of the day and year first written.

I hereby certify that there is an unencumbered balance of $_____ available for this contract; and furthermore that this sum is hereby encumbered against the appropriate account for the purpose of this Agreement. Further, I certify that as funds become available, I will encumber additional amount of money as are required under this Contract.

_____
Town Accountant

Approved as to legal form:

_____
Town Counsel

_____
Town Manager

_____
Contractor Name (Printed)

_____
Contractor's Signature (Title)

(Party of the second part) (Date) _____

CONTRACTOR'S SEAL:

Certificate of Acknowledgment of Contractor if a Corporation

For AGREEMENT

State of Massachusetts

County of _____

On this _____ day of _____, 20__, before me

personally came _____ to me

known, who being by me duly sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument, that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

_____
Notary Public (Seal)

My commission expires _____

CONTRACTOR'S SEAL:

SECTION 00.61.13.13

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:
That we,_____, as Principal, and
_____, as Surety,
are held and firmly bound unto the _____AWARDING AUTHORITY, as Obligee,
in the sum of _____dollars ($_____)
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 _____ in _____, Massachusetts.
PROJECT TITLE

NOW, the condition of this obligation is such that if the Principal and all Subcontractors under said contract shall well and truly keep and perform all the undertakings, covenants, agreement, terms and conditions of said contract on its part to be kept and performed during the original term of said contract and any extensions thereof that may be granted by the Obligee, with or without notice to the Surety, and during the life and any guarantee required under the contract, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations changes or additions to said contract that may hereafter be made, notice to the Surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

IN THE EVENT, that the contract is abandoned by the Principal, or in the event that the Obligee, under the provisions of Article 19 of the General Conditions of said contract terminates the employment of the Principal or the authority of the Principal to continue the work, said Surety hereby further agrees that said Surety shall, if requested in writing by the Obligee, take such action as is necessary to complete said contract.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals this:

_____Day of _____20____

PRINCIPAL _____ SURETY _____

By: _____ By: _____
SEAL ATTORNEY-IN FACT

Attest: _____ Attest: _____

The rate for this bond is _____% for the first $_____ and ____% for the next $ _____

The total premium for this bond is $ _____

END OF SECTION

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SECTION 00.61.13.16

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:
That we,_____, as Principal, and
_____, as Surety,
are held and firmly bound unto the _____AWARDING AUTHORITY, as Obligee,
in the sum of _____dollars ($_____)
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 _____ in _____, Massachusetts.
PROJECT TITLE

NOW 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 any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter 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 null and void; otherwise it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals this:

_____Day of _____20____

PRINCIPAL _____ SURETY _____

By: _____ By: _____
SEAL ATTORNEY-IN FACT

Attest: _____ Attest: _____

The rate for this bond is _____% for the first $_____ and ____% for the next $ _____

The total premium for this bond is $ _____

END OF SECTION

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Section 00.61.17

COMMONWEALTH OF MASSACHUSETTS

STATEMENT OF TAX PAYMENTS

Pursuant to M.G.L. Chapter 62C, Section 49A, I certify under the penalties of perjury that I, to the best of my knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

_____	_____
Social Security Number or Federal Identification Number	Signature of Individual or Corporate Name
_____	_____
Date	Corporate Officer & Title (If applicable)

CONTRACTOR'S SEAL:

END OF SECTION

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SECTION 00.73.00

SPECIAL CONDITIONS

7.1 – CONFLICT OF INCONSISTENCY

If there be any conflict or inconsistency between the provisions of the SPECIAL CONDITIONS and the provisions of the other Contract Documents, the provisions of the SPECIAL CONDITIONS shall prevail. If there be any conflict or inconsistency between the provisions of the AGREEMENT and the provisions of any of the Contract Documents other than the SPECIAL CONDITIONS, the provisions of the AGREEMENT shall prevail.

7.2 – AMOUNT OF LIQUIDATED DAMAGES

The amount of liquidated damages for delay to be assessed under those Subsections of the AGREEMENT entitled "TIME FOR COMPLETION" and "LIQUIDATED DAMAGES" shall be $250.00, per day.

7.3 – PERCENTAGE OF PROGRESS ESTIMATES TO BE RETAINED

The percentage of estimates to be retained as indicated under that Subsection of the AGREEMENT entitled "MONIES MAY BE RETAINED" shall be five (5) percent with the Auburn School District reserving the right to retain up to ten (10) percent of the total contract price for a period of up to 180 days from the time of completion of the Work as insurance of and acceptance of the Work.

7.4 – AMOUNT OF MINIMUM PROGRESS ESTIMATES

No payments will be made to the Contractor until such time that the Contractor has submitted the required periodic payroll records to the Owner and all other statements, certifications and records required by the Department of Labor and Industries.

No payments will be made for a work or material item requiring a field or laboratory test until such time as said testing has been satisfactorily completed, with results which meet or exceed those specified and copies of the test results have been delivered to and approved by the Architect.

Other than for final payment, no progress payment request needs to be submitted by the Contractor, when in the judgment of the Architect, the value of the work done since the last payment estimate amounts to less than $1,000.00 notwithstanding the time frame for payments indicated in the Agreement.

7.5 – LIMITS FOR INSURANCE

The limits for the various types of insurance required under that Subsection of the AGREEMENT, entitled "INSURANCE" shall not be less than:

A. For liability for bodily injury, including accidental death $1,000,000 for any one person and subject to the same limit for each person, $2,000,000 on account of one occurrence.

B. For liability for property damage other than that caused by operation of motor vehicles, $1,000,000 on account of one occurrence and $2,000,000 on account of all occurrences.

C. For property damage covering the operation of motor vehicles, not less than $300,000.

D. For Contractual Liability, the amounts required under A and B above.

E. For Worker's Compensation, as required by the Laws of the Commonwealth of Massachusetts.

F. Provide coverage for blasting if required for performance of the work.

7.6 – EXCERPTS FROM MASSACHUSETTS STATUTES

A. In addition to the requirements as set forth herein under the AGREEMENT, particular attention is directed to certain stipulations of Chapter 149 of the General Laws of Massachusetts, and to Chapter 30, Section 39F, as amended to date as follows:

Chapter 149

Section 25 – "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 therefore, for the doing of public work shall directly or indirectly require, as a condition of employment herein, 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".

Section 26 – "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 of 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 veterans as defined in Clause 43 of Section 7 of Chapter 4, 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".

Section 34 – "Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foreman or inspectors to which the Commonwealth of any country or any town, subject to Section 30, is a party, shall contain a stipulation that no laborer, workman, mechanic or inspection working within the Commonwealth, in the employ of the contractor, subcontractor 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 48 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 31 is a party to such contract, more than eight hours in any one day except as aforesaid.

Section 34B – "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 such city or town".

Chapter 30

Section 39F – Method of Payment to Subcontractors under Certain Public Works Contracts; Deposit of Amounts in Dispute, Proceedings to Enforce Claims to Amounts on Deposit.

(1) Every contract awarded pursuant to sections forty-four A to I, inclusive, of chapter one hundred and forty-nine (149) shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M (39M) of chapter thirty shall contain the following subparagraphs (a) through (h) and in case those subparagraphs shall be binding between the general contractor.

(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) No later than the sixty-fifth (65th) 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 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 amount 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 it so be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraph (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy (70) 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 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 (70^{th}) day after the subcontractor has substantially completed the subcontract work. Within ten (10) days after the subcontractor has delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be a sworn statement 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 (15) days after receipt of the demand by the awarding authority, but in no event prior to the seventieth (70^{th}) 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 reviewing 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 payment and all deduction 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 order of receipt of such demands

for 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 claim against such amounts by creditors of the general contractor.

7.7 – MASSACHUSETTS SALES AND USE TAX

Materials and equipment purchased for permanent installation in this project will be exempt from the Massachusetts Sales and Use Tax. The Exemption Certificate Number will be furnished to the Contractor. Each bidder shall take this exemption into account in calculating his Bid for the work.

7.8 – INTERFERNCE WITH EXISTING WORK

The Contractor shall at times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work shall be planned to interfere with the operation of the existing facilities for the shortest possible time when the demands on the facilities best permit such interference, even though it may be necessary to work outside normal working hours to meet these requirements. Before starting work which will interfere with the operation of existing facilities, the Contractor shall obtain approval from the Engineer, shall do all possible preparatory work, and shall see that all tools, materials and equipment are made ready and at hand.

7.9 – WATER SUPPLY

Refer to Section 01.50.00 – Temporary Facilities and Controls.

7.10 – MINIMUM WAGE RATES

A schedule of Minimum Wage Rates issued for the work under this Contract by the Commissioner of Labor and Industries of Massachusetts, in accordance with Chapter 149, Sections 26 to 27 inclusive, is herein attached to these Specifications. Refer to Section 00.73.43 – Labor Regulations.

7.11 – MINORITY HIRING/BUSINESS REQUIREMENTS

All Contractors shall comply with all applicable requirements of the Commonwealth of Massachusetts Executive Department Executive Order No. 237 regarding minority business development, and in compliance with applicable section of Massachusetts General Laws pertaining to Equal Opportunity Employment and Anti-Discrimination and Affirmative Action programs.

7.12 – OSHA CERTIFICATION REQUIREMENTS

All Contractors shall comply with all applicable requirements of the Commonwealth of Massachusetts regarding the OSHA 10 hour training course, and in compliance with Massachusetts General Laws, Chapter 30, Sections 39M(c) and 39S(a)(2) and Chapter 149 Sections 44E-44F.

7.13 - EXISTING CONDITIONS/SITE VISIT

A. BEFORE SUBMITTING HIS BID, the Contractor shall make a thorough examination of the conditions at the site, checking the requirements of the Plans and Specifications with the existing conditions.

B. No claim for extra compensation or extension of time will be allowed on account of the Contractor's failure to estimate properly the quantities, locations and measurements of all items required to complete the work.

C. Report any discrepancies in writing to the Architect and request his interpretation.

D. The Contractor shall contact the Owner to schedule an appointment to view the existing site, structure, etc.

7.14 – SUBMITTALS

A. Refer to Section 01.33.00 – Submittals.

7.15 – START UP

A. The Contractor will provide all necessary filters and fluids including oils, grease, chemicals, additives and associated laboratory testing necessary in order to have the facility in a working and safe operational state.

7.16 – TRAFFIC REGULATION

A. Bids shall include the cost of a police detail work exterior work, as required by the Town.

7.17 – DAMAGE TO EXISTING STRUCTURES

The Contractor shall be responsible for any damage to roadway and other surface and subsurface structures, such as walls, fences, culverts, drains, water mains, properly marked telephone, gas or electric lines, etc., whether shown or not shown on the plans. The Contractor shall supply all labor and materials necessary to repair the damage at no cost to the Owner.

7.18 –LOCATION OF UNDERGROUND UTILITIES AND SERVICES

The location of the underground utilities and services was prepared from the best information available and is not guaranteed. Any main damage by the Contractor shall be repaired by the Contractor at his expense regardless of whether it is indicated on the Drawings, or whether it is in the location indicated on the Drawings. The Contractor shall, at his own expense, furnish all materials necessary to affect any repairs required.

The appropriate utility should be contacted by the Contractor to mark out the existing utilities in the field in critical areas.

It shall be the responsibility of the Contractor to perform the necessary test pits to determine pipe size location, depth of existing utilities, etc., as necessary for the performance of his work at no additional cost to the Owner.

7.19 – BARRIERS

A. Protection of Persons and Property

1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work.

    a. The Contractor shall secure the site and portions thereof from unauthorized entry at all times by temporarily erecting fences, gates guard rails as may be necessary for the protection of the public, visitors and workers in accordance with all Local, State and Federal rules and ordinances.

2. Take all reasonable precautions for the safety of and provide all reasonable protection to prevent damage, injury or loss to:

    a. All employees on the Work and all other persons who may be affected thereby.

b. All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his subcontractors.

c. Any other property at the site or adjacent thereto, including (but not limited to) equipment, existing construction to remain, trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of the Work. Restore to original condition or replace any property on and/or off the site, which may be damaged or destroyed in the execution of the Work.

3. Comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

4. Erect and maintain, as required by existing conditions and progress of the work all safeguards for safety and protection, including posting danger signs and other warnings against hazards promulgating safety regulations and notifying owners and users of adjacent utilities.

5. Not used.

6. Remedy all damage or loss to any property caused in whole or in part by the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts may be liable, and for which the Contractor is responsible, except damage or loss attributable to the acts or omissions of the Owner, or the Engineer or anyone directly or indirectly employed by either of them or by anyone for whose acts either of them may be liable.

7. The Contractor shall designate a responsible member of his organization at the site, whose duty shall be the prevention of accidents. This person shall be the Contactor's superintendent unless otherwise designated by the Contractor.

8. The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

9. In any emergency affecting the safety of persons of property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss.

10. Water protection: Protect excavation, trenches and buildings from damage form rainwater, spring water, groundwater, backing-up of drains and other waters. Provide pumps, equipment and enclosures as required to provide this protection. Construct and maintain temporary drainage and do pumping necessary to keep excavation free of water.

11. Remove snow and ice as necessary for safety and proper execution of work.

12. Provide constant protection against the weather as required to maintain work, materials, apparatus, and fixtures, free from injury or damage. If low temperatures make it impossible to continue operations, cease work and notify the Engineer.

13. Shore, brace, enclose, and otherwise protect, as required, existing building(s) or structure (s) from damage during course of work on the same.

14. At the completion of each workday, sufficient barricades, fences and warning devices shall be erected around those areas not restored to existing grade and condition to provide for the safety of all persons.

B. Protection of Trees

1. The Contractor shall be required to use construction techniques that minimize the damage of trees located adjacent to the construction area that are to remain. Small trees, bushes, and shrubs located within the area of excavation if indicated to be replanted elsewhere shall be carefully removed, temporarily stored,

and replanted in accordance with the latest horticultural practices. The trees shall be located as directed by the Engineer.

2. Any trees outside of the indicated clearing area permanently damaged by the Contractor shall be replaced with a tree of the same species as directed by the Engineer. The trees shall be of the same size or the largest locally commercial size available. This work shall be performed at no additional cost to the Owner.

3. All trees planted and/or replaced shall be guaranteed for a period of one (1) year from the time of final acceptance of this project.

7.20 – SPECIAL CONTROLS

A. Noise control

1. The Contractor and any subcontractors shall at all times employ measures to minimize the noise(s) produced during construction, to keep noise levels below the allowable limits as described in applicable rules, regulations and guidelines.

2. The cost of noise reduction methods shall be at the Contractor's expense.

3. Equipment that is generating excess noise due to damaged or defective engine exhaust, mufflers, shall not be used until such time that the exhaust system has been repaired.

B. Dust Control

1. The Contractor shall employ measures to prevent and contain dust within the area affected by the project, suitable for the conditions present. No additional compensation will be paid to the Contractor for general dust control measures including watering or use of calcium chloride, if in the opinion of the Engineer are necessary to control excessive dust conditions.

2. The Contractor shall, when directed by the Engineer, remove accumulated soil deposits on adjacent roadways as indicated in these Specifications.

C. Water

1. The Contractor shall provide and maintain at no additional cost all pumps, piping, drains, well points, or any other facility for the control and collection of groundwater or surface water. The dewatering operations shall be such that all excavations may be kept, at all time, free from water so that all construction operations shall be carried out in such a manner that no loss of ground or disturbance to the bearing of it will result from these operations. Precautions shall be taken to protect new and existing work from flooding during storms and other causes. Pumping shall be continued where required to protect the work and to maintain satisfactory progress. All pipelines and structures not stable against uplift during construction or prior to completion shall be thoroughly braved or otherwise protected. A detailed dewatering plan shall be submitted to the Engineer. Discharged water shall be piped to an area approved by the Engineer. The Contractor shall provide devices (hay bales, crushed stone, etc.) as necessary to control the discharge of sediments during construction and dewatering operations.

D. Wind

1. The Contractor shall maintain all parts of the work properly braced during construction to withstand all loads imposed by wind. All damages incurred by wind conditions to materials, whether or not incorporated into the work, shall be rectified by the Contractor at his own expense, which shall include providing new materials as may be required and furnishing all necessary labor.

E. Structural

1. Bracing, Shoring and Sheeting: The Contractor shall provide all bracing, shoring, underpinning and sheeting as required for safety and for the proper sequence and execution of work. He shall secure and protect, as may be necessary, all walls, and other existing structures adjacent to adjoining, and in the vicinity of construction, which may in any way be affected by the operations connected with the demolition, site clearance and excavation of the project areas. The Contractor shall be responsible for giving of any and all required notices to any adjoining or adjacent property owners before commencement of any work. Unless otherwise ordered by the Engineer all bracing, shoring and sheeting shall be removed when work is completed.

F. Erosion Controls

1. Not applicable.

G. Environmental Control

1. The Contractor is required to inform himself of all applicable Local, State and Federal rules and regulations concerning the maintenance of environmental quality and to conduct his operations in conformance with the intent of such rules and regulations at all times.

2. In the event that a question of conformance arises, the Engineer shall have the authority to order discontinuance of the work or activity in contention until resolution satisfactory to State and/or Federal agencies is achieved. The Contractor shall bear all costs associated with making his work conform, including, but not limited to, cost of corrective repairs or changes in construction procedures.

3. The Contractor shall conduct his operations to be in conformance with the requirements of the Order of Conditions or other Environmental Protection Permit or License or stipulations issued for the subject project by applicable local, State or Federal agencies or authorities.

7.21 – DELAYS BY THE OWNER

Except as otherwise provided by law, the Contractor shall not be entitled to damages on account of any hindrances or delays due to the Owner's inability to obtain any permits, licenses or easements necessary for completion of all or any part of the work. In said case the Contractor shall be entitled to an extension of time only in which to complete the work, to be determined by the Engineer.

7.22 – PERMITS, LICENSES, CERTIFICATES, ORDERS

The Contractor shall be responsible for obtaining a Building Permit from the Town, and shall include the costs of such permit in the Bid. Where working involving Plumbing or Electrical requires a permit for the scope of work to be performed, the Contractor shall obtain, or sub-contract with licensed personnel who shall obtain all required permits.

The Contractor shall comply with the requirements or conditions of any local, State or Federal approvals, permits, licenses, certifications or order of conditions, that may be issued for the project a herein attached or indicated. Compliance with said requirements shall be the sole responsibility of the Contractor and shall be responsible for all costs and ramifications incurred as the result of the Contractor's failure to comply.

7.23 – STATE AGENCY REVIEW

At any time during construction, the Contractor shall allow field inspection and review of the project by the Owner or Architect.

7.24 – HOURS OF OPERATION

Refer to Section 01.50.00 – Temporary Facilities and Controls.

Operations which create objectionable levels of noise, as compared with the ambient normal levels of the work site as determined by the Owner shall not be permitted before or after the indicated hours and/or as otherwise restricted by local or State ordinances or regulations.

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Section 00.73.43

Wage Rates and Statement of Compliance

PART 1 – GENERAL

1.1 APPLICABLE LAWS

A. All provisions of the Contract Documents shall be subject to all applicable provisions of law, including, without limitation, the Commonwealth of Massachusetts statutes relating to prevailing wages, record keeping and reporting.

1. All applicable provisions of law are a part of this Contract.
2. Incorrect citations of statutes in this section shall not relieve the Contractor of its obligations under law. In case of a conflict between the Contract Documents and applicable statutes, the provisions of law shall govern.

2.1 WAGE RATES

A. Wage Rates: The minimum rates of wages to be paid to mechanics and apprentices, chauffeurs, teamsters and laborers shall be set forth in the schedule of rates and wages determined by the Massachusetts Department of Labor and Workforce Development, which schedule is appended to this section and made a part of the Contract, in accordance with and subject to the provisions of M.G.L. Chapter 149, Section 26 and 27, as amended.

1. The Wage Determination Schedule provided to the Architect and Awarding Authority by governmental authorities is appended to this section. The Architect and Awarding Authority do not guarantee the accuracy of the schedule, and every bidder and contractor shall be responsible for ascertaining the prevailing wages in the area where the work will be performed.

B. Payment Insurance: In accordance with M.G.L. Chapter 149, Section 34A, the Contractor shall, before commencing performance of the Contract, provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 to all persons to be employed under the Contract, and the Contractor shall continue such insurance in full force and effect during the term of the Contract.

1. Sufficient proof of compliance with this section must be furnished at the time of execution of this Contract.

2. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of Contract and shall operate as an immediate termination thereof. The attention of the Contractor is directed to that portion M.G.L. Chapter 149, Section 34A, which provides that whoever violates any of its provisions 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.

C. Records: Every contractor and subcontractor working under the terms of any contract for the construction on this project shall file weekly payroll records with Awarding Authority in the form described in M.G.L. Chapter 149, Sections 26 and 27B and as amended by Section 174 of Chapter 110 of the Acts of 1993. These records should be attached to the Application for Payment.

1. The Attorney General's Office, after conducting an investigation and hearing, can order work halted on public works projects, if it finds prevailing wage violations.

2. Any delays and costs incurred by the Awarding Authority associated with a stop work order for prevailing wage violation will be borne solely by the General Contractor.

D. Statement of Compliance: The Contractor and each Subcontractor shall furnish to the Office of the Attorney General and to the Awarding Authority, within 15 days after completion of its portion of the work, fully completed and certified copies of the attached "Statement of Wage Rate Compliance" certifying compliance with wage and benefit provisions of M.G.L. Chapter 149, Sections 26 and 27, and as amended by Section 331 of Chapter 110 of the Acts of 1993. A copy of the "Statement of Compliance" is appended to this section.

FORM OF STATEMENT OF WAGE RATE COMPLIANCE

Date: _____, 20___

I, _____
(insert name and title of signatory party)

do hereby state that I pay or supervise the payment of the persons employed by

_____
(insert name of Contractor or Subcontractor)

on the Project

_____
(insert name of project)

and that all mechanics, apprentices, teamsters, chauffeurs, and laborers employed on said project have been paid in accordance with wages determined under the provisions of Chapters 26 and 27 of Chapter 149 of the Massachusetts General Laws.

_____
Signature

_____
Title

This Statement is signed under penalties of perjury as provided for under Section 27B of Chapter 149, Massachusetts General Laws.

APPENDIX A – PREVAILING WAGE RATES

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

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

Prevailing Wage Rates

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

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Auburn School District

Contract Number:

City/Town: AUBURN

Description of Work: Replacement of oil-fired boilers with gas-fired boilers

Job Location: 10 Swanson Rd., Auburn, MA 01501

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

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

Issue Date: 04/14/2023 **Wage Request Number:** 20230413-053

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2023	$47.37	$7.07	$20.31	$0.00	$74.75
	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2023

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

Effective Date - 01/01/2024

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

Notes:

Apprentice to Journeyworker Ratio:1:4

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 02/01/2023

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

Effective Date - 08/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:5

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

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	03/01/2023	$45.12	$9.33	$19.97	$0.00	$74.42

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.56	$9.33	$1.73	$0.00	$33.62
2	60	$27.07	$9.33	$1.73	$0.00	$38.13
3	70	$31.58	$9.33	$14.78	$0.00	$55.69
4	75	$33.84	$9.33	$14.78	$0.00	$57.95
5	80	$36.10	$9.33	$16.51	$0.00	$61.94
6	80	$36.10	$9.33	$16.51	$0.00	$61.94
7	90	$40.61	$9.33	$18.24	$0.00	$68.18
8	90	$40.61	$9.33	$18.24	$0.00	$68.18

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $30.71/ 3&4 $36.93/ 5&6 $56.82/ 7&8 $63.06

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17
All Aspects of New Wood Frame Work						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.50	$7.21	$0.00	$0.00	$21.71
2	60	$14.50	$7.21	$0.00	$0.00	$21.71
3	65	$15.70	$7.21	$0.00	$0.00	$22.91
4	70	$16.91	$7.21	$0.00	$0.00	$24.12
5	75	$18.12	$7.21	$3.80	$0.00	$29.13
6	80	$19.33	$7.21	$3.80	$0.00	$30.34
7	85	$20.54	$7.21	$3.80	$0.00	$31.55
8	90	$21.74	$7.21	$3.80	$0.00	$32.75

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.86/ 3&4 $20.22/ 5&6 $27.57/ 7&8 $29.94

Apprentice to Journeyworker Ratio:1:5

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CEMENT MASONRY/PLASTERING - Worcester*

Effective Date - 01/01/2023

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

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.30	$15.49	$0.00	$0.00	$40.79
2	60	$30.35	$15.49	$8.12	$0.00	$53.96
3	65	$32.88	$15.49	$8.12	$0.00	$56.49
4	70	$35.41	$15.49	$8.12	$0.00	$59.02
5	75	$37.94	$15.49	$8.12	$0.00	$61.55
6	80	$40.47	$15.49	$8.12	$0.00	$64.08
7	90	$45.53	$15.49	$8.12	$0.00	$69.14

Notes:

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$54.68	$14.25	$16.05	$0.00	$84.98
	06/01/2023	$55.95	$14.25	$16.05	$0.00	$86.25
	12/01/2023	$57.23	$14.25	$16.05	$0.00	$87.53
	06/01/2024	$58.55	$14.25	$16.05	$0.00	$88.85
	12/01/2024	$60.03	$14.25	$16.05	$0.00	$90.33
	06/01/2025	$61.36	$14.25	$16.05	$0.00	$91.66
	12/01/2025	$62.83	$14.25	$16.05	$0.00	$93.13
	06/01/2026	$64.16	$14.25	$16.05	$0.00	$94.46
	12/01/2026	$65.64	$14.25	$16.05	$0.00	$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2023

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

Effective Date - 07/01/2023

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

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 96*

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.24	$12.20	$0.55	$0.00	$30.99
2	43	$19.60	$12.20	$0.59	$0.00	$32.39
3	48	$21.88	$12.20	$14.18	$0.00	$48.26
4	55	$25.07	$12.20	$14.63	$0.00	$51.90
5	65	$29.63	$12.20	$15.27	$0.00	$57.10
6	80	$36.47	$12.20	$16.22	$0.00	$64.89

Notes:

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

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2022	$58.62	$16.03	$20.21	$0.00	$94.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.31	$16.03	$0.00	$0.00	$45.34
2	55	$32.24	$16.03	$20.21	$0.00	$68.48
3	65	$38.10	$16.03	$20.21	$0.00	$74.34
4	70	$41.03	$16.03	$20.21	$0.00	$77.27
5	80	$46.90	$16.03	$20.21	$0.00	$83.14

Notes:

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2022	$41.03	$16.03	$20.21	$0.00	$77.27

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/05/2022	$48.67	$14.25	$16.05	$0.00	$78.97
	05/01/2023	$49.91	$14.25	$16.05	$0.00	$80.21
	11/01/2023	$51.15	$14.25	$16.05	$0.00	$81.45
	05/01/2024	$52.39	$14.25	$16.05	$0.00	$82.69
	11/01/2024	$53.68	$14.25	$16.05	$0.00	$83.98
	05/01/2025	$55.12	$14.25	$16.05	$0.00	$85.42
	11/01/2025	$56.41	$14.25	$16.05	$0.00	$86.71
	05/01/2026	$57.85	$14.25	$16.05	$0.00	$88.15
	11/01/2026	$59.14	$14.25	$16.05	$0.00	$89.44
	05/01/2027	$60.57	$14.25	$16.05	$0.00	$90.87
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2022	$50.22	$14.25	$16.05	$0.00	$80.52
	05/01/2023	$51.47	$14.25	$16.05	$0.00	$81.77
	11/01/2023	$52.72	$14.25	$16.05	$0.00	$83.02
	05/01/2024	$53.97	$14.25	$16.05	$0.00	$84.27
	11/01/2024	$55.27	$14.25	$16.05	$0.00	$85.57
	05/01/2025	$56.72	$14.25	$16.05	$0.00	$87.02
	11/01/2025	$58.02	$14.25	$16.05	$0.00	$88.32
	05/01/2026	$59.47	$14.25	$16.05	$0.00	$89.77
	11/01/2026	$60.77	$14.25	$16.05	$0.00	$91.07
	05/01/2027	$62.22	$14.25	$16.05	$0.00	$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2022	$24.31	$14.25	$16.05	$0.00	$54.61
	05/01/2023	$25.05	$14.25	$16.05	$0.00	$55.35
	11/01/2023	$25.78	$14.25	$16.05	$0.00	$56.08
	05/01/2024	$26.51	$14.25	$16.05	$0.00	$56.81
	11/01/2024	$27.27	$14.25	$16.05	$0.00	$57.57
	05/01/2025	$28.12	$14.25	$16.05	$0.00	$58.42
	11/01/2025	$28.88	$14.25	$16.05	$0.00	$59.18
	05/01/2026	$29.73	$14.25	$16.05	$0.00	$60.03
	11/01/2026	$30.49	$14.25	$16.05	$0.00	$60.79
	05/01/2027	$31.34	$14.25	$16.05	$0.00	$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$43.54	$14.25	$16.05	$0.00	$73.84
	06/01/2023	$44.56	$14.25	$16.05	$0.00	$74.86
	12/01/2023	$45.57	$14.25	$16.05	$0.00	$75.87
	06/01/2024	$46.63	$14.25	$16.05	$0.00	$76.93
	12/01/2024	$47.81	$14.25	$16.05	$0.00	$78.11
	06/01/2025	$48.87	$14.25	$16.05	$0.00	$79.17
	12/01/2025	$50.04	$14.25	$16.05	$0.00	$80.34
	06/01/2026	$51.10	$14.25	$16.05	$0.00	$81.40
	12/01/2026	$52.28	$14.25	$16.05	$0.00	$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$25.23	$9.35	$16.89	$0.00	$51.47
	06/01/2023	$25.98	$9.35	$16.89	$0.00	$52.22
	12/01/2023	$25.98	$9.35	$16.89	$0.00	$52.22
	06/01/2024	$27.01	$9.35	$16.89	$0.00	$53.25
	12/01/2024	$27.01	$9.35	$16.89	$0.00	$53.25
	06/01/2025	$28.09	$9.35	$16.89	$0.00	$54.33
	12/01/2025	$28.09	$9.35	$16.89	$0.00	$54.33
	06/01/2026	$29.21	$9.35	$16.89	$0.00	$55.45
	12/01/2026	$29.21	$9.35	$16.89	$0.00	$55.45
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE II*	03/01/2022	$47.96	$9.33	$20.27	$0.00	$77.56

Apprentice - *FLOORCOVERER - Local 2168 Zone II*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.98	$9.33	$1.79	$0.00	$35.10
2	55	$26.38	$9.33	$1.79	$0.00	$37.50
3	60	$28.78	$9.33	$14.90	$0.00	$53.01
4	65	$31.17	$9.33	$14.90	$0.00	$55.40
5	70	$33.57	$9.33	$16.69	$0.00	$59.59
6	75	$35.97	$9.33	$16.69	$0.00	$61.99
7	80	$38.37	$9.33	$18.48	$0.00	$66.18
8	85	$40.77	$9.33	$18.48	$0.00	$68.58

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $31.90/ 3&4 $38.39/ 5&6 $58.70/ 7&8 $65.26

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.78	$8.65	$0.00	$0.00	$31.43
2	55	$25.06	$8.65	$6.27	$0.00	$39.98
3	60	$27.34	$8.65	$6.84	$0.00	$42.83
4	65	$29.61	$8.65	$7.41	$0.00	$45.67
5	70	$31.89	$8.65	$19.63	$0.00	$60.17
6	75	$34.17	$8.65	$20.20	$0.00	$63.02
7	80	$36.45	$8.65	$20.77	$0.00	$65.87
8	90	$41.00	$8.65	$21.91	$0.00	$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$8.65	$0.00	$0.00	$32.03
2	55	$25.72	$8.65	$6.27	$0.00	$40.64
3	60	$28.06	$8.65	$6.84	$0.00	$43.55
4	65	$30.39	$8.65	$7.41	$0.00	$46.45
5	70	$32.73	$8.65	$19.63	$0.00	$61.01
6	75	$35.07	$8.65	$20.20	$0.00	$63.92
7	80	$37.41	$8.65	$20.77	$0.00	$66.83
8	90	$42.08	$8.65	$21.91	$0.00	$72.64

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 12/01/2022

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

Effective Date - 06/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS LOCAL 4*	03/01/2023	$51.50	$9.80	$17.42	$0.00	$78.72
	09/01/2023	$52.90	$9.80	$17.42	$0.00	$80.12
	03/01/2024	$54.30	$9.80	$17.42	$0.00	$81.52
	09/01/2024	$55.70	$9.80	$17.42	$0.00	$82.92
	03/01/2025	$57.10	$9.80	$17.42	$0.00	$84.32
	09/01/2025	$58.50	$9.80	$17.42	$0.00	$85.72
	03/01/2026	$59.90	$9.80	$17.42	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS LOCAL 4*	03/01/2023	$51.50	$9.80	$17.42	$0.00	$78.72
	09/01/2023	$52.90	$9.80	$17.42	$0.00	$80.12
	03/01/2024	$54.30	$9.80	$17.42	$0.00	$81.52
	09/01/2024	$55.70	$9.80	$17.42	$0.00	$82.92
	03/01/2025	$57.10	$9.80	$17.42	$0.00	$84.32
	09/01/2025	$58.50	$9.80	$17.42	$0.00	$85.72
	03/01/2026	$59.90	$9.80	$17.42	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

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

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (WORCESTER AREA)*	03/16/2023	$52.42	$8.35	$26.70	$0.00	$87.47
	03/16/2024	$53.67	$8.35	$26.70	$0.00	$88.72

Apprentice - *IRONWORKER - Local 7 Worcester*

Effective Date - 03/16/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$31.45	$8.35	$26.70	$0.00	$66.50
2	70	$36.69	$8.35	$26.70	$0.00	$71.74
3	75	$39.32	$8.35	$26.70	$0.00	$74.37
4	80	$41.94	$8.35	$26.70	$0.00	$76.99
5	85	$44.56	$8.35	$26.70	$0.00	$79.61
6	90	$47.18	$8.35	$26.70	$0.00	$82.23

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 *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.30	$9.10	$16.64	$0.00	$48.04
2	70	$26.01	$9.10	$16.64	$0.00	$51.75
3	80	$29.73	$9.10	$16.64	$0.00	$55.47
4	90	$33.44	$9.10	$16.64	$0.00	$59.18

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.84	$9.10	$16.64	$0.00	$48.58
2	70	$26.64	$9.10	$16.64	$0.00	$52.38
3	80	$30.45	$9.10	$16.64	$0.00	$56.19
4	90	$34.25	$9.10	$16.64	$0.00	$59.99

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.56	$9.35	$16.89	$0.00	$62.80
	06/01/2023	$37.46	$9.35	$16.89	$0.00	$63.70
	12/01/2023	$38.36	$9.35	$16.89	$0.00	$64.60
	06/01/2024	$39.69	$9.35	$16.89	$0.00	$65.93
	12/01/2024	$41.02	$9.35	$16.89	$0.00	$67.26
	06/01/2025	$42.41	$9.35	$16.89	$0.00	$68.65
	12/01/2025	$43.79	$9.35	$16.89	$0.00	$70.03
	06/01/2026	$45.23	$9.35	$16.89	$0.00	$71.47
	12/01/2026	$46.67	$9.35	$16.89	$0.00	$72.91

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.94	$9.35	$16.89	$0.00	$48.18
2	70	$25.59	$9.35	$16.89	$0.00	$51.83
3	80	$29.25	$9.35	$16.89	$0.00	$55.49
4	90	$32.90	$9.35	$16.89	$0.00	$59.14

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.48	$9.35	$16.89	$0.00	$48.72
2	70	$26.22	$9.35	$16.89	$0.00	$52.46
3	80	$29.97	$9.35	$16.89	$0.00	$56.21
4	90	$33.71	$9.35	$16.89	$0.00	$59.95

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
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 *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2023	$46.25	$11.49	$20.37	$0.00	$78.11
	08/01/2023	$47.89	$11.49	$20.37	$0.00	$79.75
	02/01/2024	$48.89	$11.49	$20.37	$0.00	$80.75
	08/01/2024	$50.57	$11.49	$20.37	$0.00	$82.43
	02/01/2025	$51.61	$11.49	$20.37	$0.00	$83.47
	08/01/2025	$53.33	$11.49	$20.37	$0.00	$85.19
	02/01/2026	$54.41	$11.49	$20.37	$0.00	$86.27
	08/01/2026	$56.17	$11.49	$20.37	$0.00	$88.03
	02/01/2027	$57.29	$11.49	$20.37	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 02/01/2023

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

Effective Date - 08/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:3

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 02/01/2023

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

Effective Date - 08/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 3) *MILLWRIGHTS LOCAL 1121 - Zone 3*	01/02/2023	$40.16	$8.58	$21.57	$0.00	$70.31

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 3*

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.09	$8.58	$5.72	$0.00	$36.39
2	65	$26.10	$8.58	$17.93	$0.00	$52.61
3	75	$30.12	$8.58	$18.98	$0.00	$57.68
4	85	$34.14	$8.58	$20.01	$0.00	$62.73

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 *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$24.37	$14.25	$16.05	$0.00	$54.67
	06/01/2023	$24.94	$14.25	$16.05	$0.00	$55.24
	12/01/2023	$25.51	$14.25	$16.05	$0.00	$55.81
	06/01/2024	$26.11	$14.25	$16.05	$0.00	$56.41
	12/01/2024	$26.77	$14.25	$16.05	$0.00	$57.07
	06/01/2025	$27.37	$14.25	$16.05	$0.00	$57.67
	12/01/2025	$28.03	$14.25	$16.05	$0.00	$58.33
	06/01/2026	$28.62	$14.25	$16.05	$0.00	$58.92
	12/01/2026	$29.29	$14.25	$16.05	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$29.57	$14.25	$16.05	$0.00	$59.87
	06/01/2023	$30.27	$14.25	$16.05	$0.00	$60.57
	12/01/2023	$30.96	$14.25	$16.05	$0.00	$61.26
	06/01/2024	$31.68	$14.25	$16.05	$0.00	$61.98
	12/01/2024	$32.48	$14.25	$16.05	$0.00	$62.78
	06/01/2025	$33.20	$14.25	$16.05	$0.00	$63.50
	12/01/2025	$34.00	$14.25	$16.05	$0.00	$64.30
	06/01/2026	$34.72	$14.25	$16.05	$0.00	$65.02
	12/01/2026	$35.52	$14.25	$16.05	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2023

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

Effective Date - 07/01/2023

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

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.48	$8.65	$0.00	$0.00	$32.13
2	55	$25.83	$8.65	$6.27	$0.00	$40.75
3	60	$28.18	$8.65	$6.84	$0.00	$43.67
4	65	$30.52	$8.65	$7.41	$0.00	$46.58
5	70	$32.87	$8.65	$19.63	$0.00	$61.15
6	75	$35.22	$8.65	$20.20	$0.00	$64.07
7	80	$37.57	$8.65	$20.77	$0.00	$66.99
8	90	$42.26	$8.65	$21.91	$0.00	$72.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.08	$8.65	$0.00	$0.00	$32.73
2	55	$26.49	$8.65	$6.27	$0.00	$41.41
3	60	$28.90	$8.65	$6.84	$0.00	$44.39
4	65	$31.30	$8.65	$7.41	$0.00	$47.36
5	70	$33.71	$8.65	$19.63	$0.00	$61.99
6	75	$36.12	$8.65	$20.20	$0.00	$64.97
7	80	$38.53	$8.65	$20.77	$0.00	$67.95
8	90	$43.34	$8.65	$21.91	$0.00	$73.90

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.51	$8.65	$0.00	$0.00	$31.16
2	55	$24.76	$8.65	$6.27	$0.00	$39.68
3	60	$27.01	$8.65	$6.84	$0.00	$42.50
4	65	$29.26	$8.65	$7.41	$0.00	$45.32
5	70	$31.51	$8.65	$19.63	$0.00	$59.79
6	75	$33.77	$8.65	$20.20	$0.00	$62.62
7	80	$36.02	$8.65	$20.77	$0.00	$65.44
8	90	$40.52	$8.65	$21.91	$0.00	$71.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.11	$8.65	$0.00	$0.00	$31.76
2	55	$25.42	$8.65	$6.27	$0.00	$40.34
3	60	$27.73	$8.65	$6.84	$0.00	$43.22
4	65	$30.04	$8.65	$19.06	$0.00	$57.75
5	70	$32.35	$8.65	$19.63	$0.00	$60.63
6	75	$34.67	$8.65	$20.20	$0.00	$63.52
7	80	$36.98	$8.65	$20.77	$0.00	$66.40
8	90	$41.60	$8.65	$21.91	$0.00	$72.16

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.78	$8.65	$0.00	$0.00	$31.43
2	55	$25.06	$8.65	$6.27	$0.00	$39.98
3	60	$27.34	$8.65	$6.84	$0.00	$42.83
4	65	$29.61	$8.65	$7.41	$0.00	$45.67
5	70	$31.89	$8.65	$19.63	$0.00	$60.17
6	75	$34.17	$8.65	$20.20	$0.00	$63.02
7	80	$36.45	$8.65	$20.77	$0.00	$65.87
8	90	$41.00	$8.65	$21.91	$0.00	$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$8.65	$0.00	$0.00	$32.03
2	55	$25.72	$8.65	$6.27	$0.00	$40.64
3	60	$28.06	$8.65	$6.84	$0.00	$43.55
4	65	$30.39	$8.65	$7.41	$0.00	$46.45
5	70	$32.73	$8.65	$19.63	$0.00	$61.01
6	75	$35.07	$8.65	$20.20	$0.00	$63.92
7	80	$37.41	$8.65	$20.77	$0.00	$66.83
8	90	$42.08	$8.65	$21.91	$0.00	$72.64

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.81	$8.65	$0.00	$0.00	$30.46
2	55	$23.99	$8.65	$6.27	$0.00	$38.91
3	60	$26.17	$8.65	$6.84	$0.00	$41.66
4	65	$28.35	$8.65	$7.41	$0.00	$44.41
5	70	$30.53	$8.65	$19.63	$0.00	$58.81
6	75	$32.72	$8.65	$20.20	$0.00	$61.57
7	80	$34.90	$8.65	$20.77	$0.00	$64.32
8	90	$39.26	$8.65	$21.91	$0.00	$69.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.41	$8.65	$0.00	$0.00	$31.06
2	55	$24.65	$8.65	$6.27	$0.00	$39.57
3	60	$26.89	$8.65	$6.84	$0.00	$42.38
4	65	$29.13	$8.65	$7.41	$0.00	$45.19
5	70	$31.37	$8.65	$19.63	$0.00	$59.65
6	75	$33.62	$8.65	$20.20	$0.00	$62.47
7	80	$35.86	$8.65	$20.77	$0.00	$65.28
8	90	$40.34	$8.65	$21.91	$0.00	$70.90

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.56	$9.35	$16.89	$0.00	$62.80
	06/01/2023	$37.46	$9.35	$16.89	$0.00	$63.70
	12/01/2023	$38.36	$9.35	$16.89	$0.00	$64.60
	06/01/2024	$39.69	$9.35	$16.89	$0.00	$65.93
	12/01/2024	$41.02	$9.35	$16.89	$0.00	$67.26
	06/01/2025	$42.41	$9.35	$16.89	$0.00	$68.65
	12/01/2025	$43.79	$9.35	$16.89	$0.00	$70.03
	06/01/2026	$45.23	$9.35	$16.89	$0.00	$71.47
	12/01/2026	$46.67	$9.35	$16.89	$0.00	$72.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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 *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS LOCAL 4*	03/01/2023	$51.50	$9.80	$17.42	$0.00	$78.72
	09/01/2023	$52.90	$9.80	$17.42	$0.00	$80.12
	03/01/2024	$54.30	$9.80	$17.42	$0.00	$81.52
	09/01/2024	$55.70	$9.80	$17.42	$0.00	$82.92
	03/01/2025	$57.10	$9.80	$17.42	$0.00	$84.32
	09/01/2025	$58.50	$9.80	$17.42	$0.00	$85.72
	03/01/2026	$59.90	$9.80	$17.42	$0.00	$87.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/PIPEFITTER - Local 4*

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.60	$9.80	$0.00	$0.00	$30.40
2	50	$25.75	$9.80	$0.00	$0.00	$35.55
3	60	$30.90	$9.80	$0.00	$0.00	$40.70
4	70	$36.05	$9.80	$7.71	$0.00	$53.56
5	80	$41.20	$9.80	$7.71	$0.00	$58.71

Effective Date - 09/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$21.16	$9.80	$0.00	$0.00	$30.96
2	50	$26.45	$9.80	$0.00	$0.00	$36.25
3	60	$31.74	$9.80	$0.00	$0.00	$41.54
4	70	$37.03	$9.80	$7.71	$0.00	$54.54
5	80	$42.32	$9.80	$7.71	$0.00	$59.83

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*	03/01/2023	$51.50	$9.80	$17.42	$0.00	$78.72
	09/01/2023	$52.90	$9.80	$17.42	$0.00	$80.12
	03/01/2024	$54.30	$9.80	$17.42	$0.00	$81.52
	09/01/2024	$55.70	$9.80	$17.42	$0.00	$82.92
	03/01/2025	$57.10	$9.80	$17.42	$0.00	$84.32
	09/01/2025	$58.50	$9.80	$17.42	$0.00	$85.72
	03/01/2026	$59.90	$9.80	$17.42	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.56	$9.35	$16.89	$0.00	$63.80
	06/01/2023	$38.46	$9.35	$16.89	$0.00	$64.70
	12/01/2023	$39.36	$9.35	$16.89	$0.00	$65.60
	06/01/2024	$40.69	$9.35	$16.89	$0.00	$66.93
	12/01/2024	$42.02	$9.35	$16.89	$0.00	$68.26
	06/01/2025	$43.41	$9.35	$16.89	$0.00	$69.65
	12/01/2025	$44.79	$9.35	$16.89	$0.00	$71.03
	06/01/2026	$46.23	$9.35	$16.89	$0.00	$72.47
	12/01/2026	$47.67	$9.35	$16.89	$0.00	$73.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	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
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2023	$48.53	$12.78	$20.20	$0.00	$81.51
	08/01/2023	$50.03	$12.78	$20.20	$0.00	$83.01
	02/01/2024	$51.28	$12.78	$20.20	$0.00	$84.26
	08/01/2024	$52.78	$12.78	$20.20	$0.00	$85.76
	02/01/2025	$54.03	$12.78	$20.20	$0.00	$87.01
	08/01/2025	$55.53	$12.78	$20.20	$0.00	$88.51
	02/01/2026	$56.78	$12.78	$20.20	$0.00	$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2023

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

Effective Date - 08/01/2023

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

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

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2023	$48.78	$12.78	$20.20	$0.00	$81.76
	08/01/2023	$50.28	$12.78	$20.20	$0.00	$83.26
	02/01/2024	$51.53	$12.78	$20.20	$0.00	$84.51
	08/01/2024	$53.03	$12.78	$20.20	$0.00	$86.01
	02/01/2025	$54.28	$12.78	$20.20	$0.00	$87.26
	08/01/2025	$55.78	$12.78	$20.20	$0.00	$88.76
	02/01/2026	$57.03	$12.78	$20.20	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 63*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.59	$4.79	$4.76	$0.92	$29.06
2	50	$20.65	$5.32	$5.29	$1.03	$32.29
3	55	$22.72	$5.85	$5.82	$1.13	$35.52
4	60	$24.78	$6.38	$6.35	$1.23	$38.74
5	65	$26.85	$6.92	$6.88	$1.33	$41.98
6	70	$28.91	$7.45	$7.41	$1.44	$45.21
7	75	$30.98	$7.98	$7.94	$1.54	$48.44
8	80	$33.04	$8.51	$15.42	$1.64	$58.61
9	85	$35.11	$9.04	$15.95	$1.74	$61.84
10	90	$37.17	$9.58	$16.48	$1.85	$65.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.15	$4.79	$4.76	$0.92	$29.62
2	50	$21.28	$5.32	$5.29	$1.03	$32.92
3	55	$23.40	$5.85	$5.82	$1.13	$36.20
4	60	$25.53	$6.38	$6.35	$1.23	$39.49
5	65	$27.66	$6.92	$6.88	$1.33	$42.79
6	70	$29.79	$7.45	$7.41	$1.44	$46.09
7	75	$31.91	$7.98	$7.94	$1.54	$49.37
8	80	$34.04	$8.51	$15.42	$1.64	$59.61
9	85	$36.17	$9.04	$15.95	$1.74	$62.90
10	90	$38.30	$9.58	$16.48	$1.85	$66.21

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 669*	04/01/2021	$43.14	$10.55	$16.41	$0.00	$70.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.41	$7.75	$0.00	$0.00	$27.16
2	50	$21.57	$7.75	$0.00	$0.00	$29.32
3	55	$23.73	$10.55	$8.15	$0.00	$42.43
4	60	$25.88	$10.55	$8.15	$0.00	$44.58
5	65	$28.04	$10.55	$8.40	$0.00	$46.99
6	70	$30.20	$10.55	$8.40	$0.00	$49.15
7	75	$32.36	$10.55	$8.40	$0.00	$51.31
8	80	$34.51	$10.55	$8.40	$0.00	$53.46
9	85	$36.67	$10.55	$8.40	$0.00	$55.62
10	90	$38.83	$10.55	$8.40	$0.00	$57.78

Notes:

Apprentice to Journeyworker Ratio:1:1

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

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

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

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2023

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

Effective Date - 08/01/2023

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

Notes:

Apprentice to Journeyworker Ratio:1:3

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

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.70	$9.35	$17.97	$0.00	$70.02
	06/01/2023	$43.70	$9.35	$17.97	$0.00	$71.02
	12/01/2023	$44.95	$9.35	$17.97	$0.00	$72.27
	06/01/2024	$46.43	$9.35	$17.97	$0.00	$73.75
	12/01/2024	$47.90	$9.35	$17.97	$0.00	$75.22
	06/01/2025	$49.40	$9.35	$17.97	$0.00	$76.72
	12/01/2025	$50.90	$9.35	$17.97	$0.00	$78.22
	06/01/2026	$52.45	$9.35	$17.97	$0.00	$79.77
	12/01/2026	$53.95	$9.35	$17.97	$0.00	$81.27
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	12/01/2022	$54.81	$9.35	$18.42	$0.00	$82.58
	06/01/2023	$55.81	$9.35	$18.42	$0.00	$83.58
	12/01/2023	$57.06	$9.35	$18.42	$0.00	$84.83
	06/01/2024	$58.54	$9.35	$18.42	$0.00	$86.31
	12/01/2024	$60.01	$9.35	$18.42	$0.00	$87.78
	06/01/2025	$61.51	$9.35	$18.42	$0.00	$89.28
	12/01/2025	$63.01	$9.35	$18.42	$0.00	$90.78
	06/01/2026	$64.56	$9.35	$18.42	$0.00	$92.33
	12/01/2026	$66.06	$9.35	$18.42	$0.00	$93.83
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2022	$56.81	$9.35	$18.42	$0.00	$84.58
	06/01/2023	$57.81	$9.35	$18.42	$0.00	$85.58
	12/01/2023	$59.06	$9.35	$18.42	$0.00	$86.83
	06/01/2024	$60.54	$9.35	$18.42	$0.00	$88.31
	12/01/2024	$62.01	$9.35	$18.42	$0.00	$89.78
	06/01/2025	$63.51	$9.35	$18.42	$0.00	$91.28
	12/01/2025	$65.01	$9.35	$18.42	$0.00	$92.78
	06/01/2026	$66.56	$9.35	$18.42	$0.00	$94.33
	12/01/2026	$68.06	$9.35	$18.42	$0.00	$95.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2022	$46.88	$9.35	$18.42	$0.00	$74.65
	06/01/2023	$47.88	$9.35	$18.42	$0.00	$75.65
	12/01/2023	$49.13	$9.35	$18.42	$0.00	$76.90
	06/01/2024	$50.61	$9.35	$18.42	$0.00	$78.38
	12/01/2024	$52.08	$9.35	$18.42	$0.00	$79.85
	06/01/2025	$53.58	$9.35	$18.42	$0.00	$81.35
	12/01/2025	$55.08	$9.35	$18.42	$0.00	$82.85
	06/01/2026	$56.63	$9.35	$18.42	$0.00	$84.40
	12/01/2026	$58.13	$9.35	$18.42	$0.00	$85.90
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2022	$48.88	$9.35	$18.42	$0.00	$76.65
	06/01/2023	$49.88	$9.35	$18.42	$0.00	$77.65
	12/01/2023	$51.13	$9.35	$18.42	$0.00	$78.90
	06/01/2024	$52.61	$9.35	$18.42	$0.00	$80.38
	12/01/2024	$54.08	$9.35	$18.42	$0.00	$81.85
	06/01/2025	$55.58	$9.35	$18.42	$0.00	$83.35
	12/01/2025	$57.08	$9.35	$18.42	$0.00	$84.85
	06/01/2026	$58.63	$9.35	$18.42	$0.00	$86.40
	12/01/2026	$60.13	$9.35	$18.42	$0.00	$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
VOICE-DATA-VIDEO TECHNICIAN *ELECTRICIANS LOCAL 96*	09/04/2022	$34.19	$12.20	$15.91	$0.00	$62.30

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *VOICE-DATA-VIDEO TECHNICIAN - Local 96*

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.10	$12.20	$4.27	$0.00	$33.57
2	55	$18.80	$12.20	$4.32	$0.00	$35.32
3	60	$20.51	$12.20	$15.50	$0.00	$48.21
4	65	$22.22	$12.20	$15.55	$0.00	$49.97
5	70	$23.93	$12.20	$15.60	$0.00	$51.73
6	75	$25.64	$12.20	$15.65	$0.00	$53.49
7	80	$27.35	$12.20	$15.70	$0.00	$55.25
8	85	$29.06	$12.20	$15.75	$0.00	$57.01

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WATER METER INSTALLER *PLUMBERS LOCAL 4*	03/01/2023	$51.50	$9.80	$17.42	$0.00	$78.72
	09/01/2023	$52.90	$9.80	$17.42	$0.00	$80.12
	03/01/2024	$54.30	$9.80	$17.42	$0.00	$81.52
	09/01/2024	$55.70	$9.80	$17.42	$0.00	$82.92
	03/01/2025	$57.10	$9.80	$17.42	$0.00	$84.32
	09/01/2025	$58.50	$9.80	$17.42	$0.00	$85.72
	03/01/2026	$59.90	$9.80	$17.42	$0.00	$87.12

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.

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SECTION 01.11.00

SUMMARY OF WORK

I PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. This section supplements the Conditions of the Contract, Prime Requirements, Drawings, and all other parts of the Contract Documents.

B. This Contractor must be familiar with all other Divisions and Sections of the Specifications which affect the work of this Section.

1.02 REQUIREMENTS INCLUDED

A. Work under this Contract.
B. Examination of Site and Documents.
C. Contract Method.
D. Work Sequence.
E. Supervision of Work.
F. Prime Contractor's Use of Premises.
G. Coordination.
H. Project Meetings.
I. Permits, Inspection, and Testing Required by Governing Authorities.
J. Cutting, Coring, Patching, Unless Otherwise Indicated.
K. Debris Removal.
L. Field Measurements.
M. Safety Regulations.
N. OSHA Safety and Health Course Documentation.
O. Damage Responsibility.
P. Owner Furnished Products.
Q. Asbestos and Hazardous Materials Discovery.
R. Special Requirements.
S. List of Drawings.

1.03 WORK UNDER THIS CONTRACT

A. The work to be done under this contract consists of executing and completing all work required for the Swanson Road Intermediate School Boiler Conversion in Auburn Massachusetts. For this contract, the HVAC Contractor will be the Prime Contractor, responsible for management and sub-contracting of the complete project.

B. The scope of work, without limiting the generality thereof, includes all labor, materials, equipment and services required to perform the work described fully in the Drawings and Specifications and includes, but is not limited to the following major work:

1. Replacement of existing oil-fired burners with new gas-fired burners.
2. Provide new gas-fired boiler and associated pumps.
3. Provide new indirect domestic hot water tank and associated pump and controls.
4. Furnish and Install temporary domestic hot water heater until the permanent system operates then remove.
5. New venting of existing and new boilers.
6. Update Owner's control system to integrate the new boiler, water heater and pumps.
7. Related electrical and plumbing work.

C. The following major elements will be performed by the Owner, under separate contracts, for which the Prime Contractor has a coordinating responsibility:

1. The School District will remove the existing underground heating oil tanks, install the new underground propane tanks, extend gas piping up to the exterior of the building terminating with a valve, backfill the excavation and repave the disturbed area.

D. The following major elements will be furnished by the Owner, for installation by the Contractor or sub-contractors:

1. None.

E. Reference to Drawings: The work to be done under this Contract is shown on the Drawings listed at the end of this Section.

F. Prevailing Wage: The Massachusetts Standard Labor Wage rates, as outlined in the exhibits, will be used in the construction of this project

1.04 EXAMINATION OF SITE AND DOCUMENTS

A. A pre-bid meeting will be held at the job site on the date and at the time indicated in the Invitation to Bid.

B. Bidders may also visit the site on a non-holiday weekday acceptable to the Owner, between the hours of 9:00 AM and 3:00 PM to visually inspect the location of the work and existing conditions that may affect new work.

C. The bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which the work is to be carried out. The Owner and Designers will not be responsible for errors, omissions, and/or charges for extra work arising from the Prime Contractor's or Subcontractor's failure to familiarize themselves with the contract documents. The Prime Contractor and Subcontractors acknowledge that they are familiar with the conditions and requirements of the contract documents where they require, in any part of the work a given result to be produced, and that the contract documents are adequate and will produce the required results.

D. Any technical questions subsequent to the submission of the bid shall be emailed to: Steve VanDyke, Nault Architects, Inc., admin@naultarchitects.com.

1.05 CONTRACT METHOD

A. Work under this contract shall be lump sum price, for the scopes of work as described in these specifications and shown on the Drawings.

1.06 WORK SEQUENCE

A. The Work will be conducted in the following sequence of demolition/construction:

1. Actual sequence of the work will be left to the discretion of the Contractor, who will prepare a construction schedule showing the sequence and duration of work, for review and approval by the Owner.

1.07 SUPERVISION OF WORK

A. The Prime Contractor shall be held directly responsible for the correct installation of all work performed under this Contract. The Prime Contractor must make good repair, without expense to the Owner, of any part of the new work, or existing work to remain, which may become inoperative on account of leaving the work unprotected or unsupervised during construction of the system or which may break or give out in any

manner by reason of poor workmanship, defective materials or any lack of space to allow for expansion and contraction of the work during the Prime Contractor's warranty period, from the date of final acceptance of the work by the Owner.

B. The Prime Contractor shall furnish a competent Massachusetts licensed superintendent satisfactory to the Owner and to the Designer. The licensed superintendent shall supervise all work under this contract and who shall remain on duty at the site throughout the Contract period while work is in progress.

1. Submit the name and resume of the superintendent for approval to the Architect. Include experience with projects of equal size and complexity.

1.08 PRIME CONTRACTOR'S USE OF PREMISES

A. Use of the Site: Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public (if applicable).

2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times, except where excavation for utilities is required. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Schedule and perform work to afford minimum of interruption to normal and continuous operation of utility systems. Submit for approval, a proposed schedule for performing work; including construction of new utilities, re-routing of existing utilities and final connection of new work to existing work. Schedule shall indicate shutdown time required for each operation.

C. The Prime Contractor shall schedule as per Section 01.50.00 - Temporary Facilities and Controls, the shutting down or interrupting any utilities, services or facilities which may affect the operation of the building outside the area of work or other buildings, services or facilities.

D. The Prime Contractor can gain access to the premises during the hours specified below. In addition the Prime Contractor and his personnel will limit themselves only within the working premises during working hours. If work needs to be scheduled during times other than those listed below, Prime Contractor shall inform the Owner one week prior to work.

1. Deliveries: 7:00 AM to 6:00 PM.
2. Work on site: 8:00 AM to 9:00 PM
3. Weekends: With Owner's permission
4. Holidays: With Owner's permission

E. The Prime Contractor shall verify that Subcontractors have visited the site and included all costs associated with the location of the project, and any restriction or limitations the location of the project may pose.

F. All contractors shall at all times conduct their operations in a courteous, professional manner while on the project or in the vicinity of the project. Harassment, offensive language or behavior will not be permitted on the site.

G. The Owner can neither accept nor assume responsibility for the security of the Contractor's material or equipment which is lost, stolen or vandalized. The Contractor is advised to exert caution in placement and storage of his equipment and material.

H. Parking: During Summer vacation, contractors may utilize the existing parking lot freely. After school resumes, contractors shall park as directed by the Owner.

I. Radios, tape players, “boom boxes”, or other audio entertainment equipment, including personal entertainment devices, shall not be allowed on the project site.

J. The Contractor shall not permit smoking within the building. Locate smoking areas away from entries, outdoor intakes, and operable windows, including adjacent buildings.

K. The Contractor shall not allow the use of intoxicating beverages or non-prescription controlled substance drugs upon or about the work site.

L. The Contractor shall provide and maintain in good serviceable condition at all times, warning signs and non-combustible barriers, forms and fire resistive tarps or plastic, each of which shall be approved by the Owner, shall be suitable for the purpose, and shall be installed adjacent to each work area, for complete enclosure and/or isolation of all excavations, wells, pits, manholes, shafts, overhead areas, etc., which are associated with the work under the contract. Barriers shall be a secure fence, guardrail, cover, or similar assembly designed and erected to provide protection for concrete, protection from the weather, and to prevent accidental access. Barrier tape and/or sawhorses shall not be used as a means of such access protection.

1.09 COORDINATION

A. The Prime Contractor shall be responsible for the proper fitting of all the work and for the coordination of the operations of all Subcontractors or material and persons engaged upon the work. The Prime Contractor shall do, or cause his agents to do, all cutting, fitting, adjusting, and repair necessary in order to make the several parts of the work come together properly.

1. Examine Contract Documents in advance of start of construction and identify in writing questions, irregularities or interference to the designer in writing. Failure to identify and address such issues in advance becomes the sole responsibility of the Prime Contractor. A conflict that would cause the reduction of the normal ceiling height of any occupied space is considered to be an interference.

B. Execute the work in an orderly and careful manner with due regard to the occupants of the facility, the public, the employees, and the normal function of the facility.

C. The work sequence shall follow planning and schedule established by the Prime Contractor as approved by the Designer and the Owner. The work upon the site of the project shall commence promptly and be executed with full simultaneous progress. Work operations which require the interruption of utilities, service, and access shall be scheduled so as to involve minimum disruption and inconvenience, and to be expedited so as to insure minimum duration of any periods of disruption or inconvenience.

D. The Prime Contractor shall review the tolerances established in the specifications for each type of work and as established by Subcontractor organizations. The Prime Contractor shall coordinate the various Subcontractors and resolve any conflicts that may exist between Subcontractor tolerances without additional cost to the Owner. The Prime Contractor shall provide any chipping, leveling, shoring or surveys to ensure that the various materials align as detailed by the Designer and as necessary for smooth transitions not noticeable in the finished work.

1.10 PROJECT MEETINGS

A. Project meetings shall be held on a weekly basis and as required subject to the discretion of the Owner.

B. Attendees: In addition to the Project Manager and Designer, 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.

C. In order to expedite construction progress on this project, the Prime Contractor shall order all materials

immediately after the approval of shop drawings and shall obtain a fixed date of delivery to the project site for all materials ordered which shall not impede or otherwise interfere with construction progress. The Prime Contractor shall present a list and written proof of all materials and equipment ordered (through purchase orders). Such list shall be presented at the meetings and shall be continuously updated.

D. Scheduling shall be discussed with all concerned parties, and methods shall be presented by the Prime Contractor, which shall reflect construction completion not being deferred or foreshortened. Identify critical long-lead items and other special scheduling requirements. The project schedule is to include time for submission of shop drawing submittals, time for review, and allowance for resubmittal and review.

1.11 PERMITS, INSPECTION, AND TESTING REQUIRED BY GOVERNING AUTHORITIES

A. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having any jurisdiction require any portion of the Work to be inspected, tested, or approved, the Prime Contractor shall give the Designer, the Owner or his/her designated representative, and such Authority timely notice (5 business days minimum) of its readiness so the Designer may observe such inspecting, testing, or approval.

B. Prior to the start of construction, the Prime Contractor shall complete application to the applicable Building Code enforcement authority for a Building Permit. Such Permit shall be displayed in a conspicuous location at the project site. The building permit fee shall be paid by the Contractor.

C. Unless otherwise specified under the Sections of the Specifications, the Prime Contractor shall pay such proper and legal fees to public officers and others as may be necessary for the due and faithful performance of the work and which may arise incidental to the fulfilling of this Contract. As such, all fees, charges, and assessments in connection with the above shall be paid by the Prime Contractor.

D. Prime Contractor and specialized Subcontractors as applicable shall identify all permits (other than Prime building permit) required from Authorities having jurisdiction over the Project for the construction and occupancy of the work. The Prime Contractor shall prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner, and shall furnish the required information to the Building Official and obtain the required permits as early as practicable after award of the Contract.

E. Prior to the start of construction, the Prime Contractor shall complete applicable applications, permits, and notifications to the MADEP, such as the Demolition/Construction form BWP AQ-06, and pay the required fees. These forms must be submitted at least 10 working days in advance of any regulated activity on the site. Demolition permits must be submitted for any work involving demolition, new construction and renovation.

1.12 CUTTING, CORING, AND PATCHING, UNLESS OTHERWISE INDICATED

A. The Prime Contractor shall perform and/or coordinate all cutting, coring, fitting and patching of the work as specified in Section 01.73.29 – Cutting and Patching.

B. The Prime Contractor shall coordinate that the work of the Subcontractor is not endangered by any cutting, coring, excavating, or otherwise altering of the work and shall not allow the cutting or altering the work of any Subcontractor except with the written consent of the Designer.

C. Performance:

1. Execute cutting and patching by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

(a) In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete work.

(b) Prior to cutting and structural steel or concrete work, contact Designer and Project Structural

Engineer in writing. Do not cut any structural steel and concrete work until approval has been granted by the Designer and the Project Structural Engineer.

2. Employ original installer or fabricator to perform cutting and patching for:

   (a) Weather-exposed or moisture-resistant elements.
   (b) Sight-exposed finished surfaces.

3. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

4. Restore work which has been cut or removed; install new products matching existing to provide completed Work in accordance with requirements of Contract Documents.

5. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

6. Patch with seams which are durable and as invisible as possible. Flash and seal all penetration of exterior work. Comply with specified tolerances for the work.

7. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.

   (a) Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch.

8. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

   (a) For continuous surfaces, refinish to nearest intersection.
   (b) For an assembly, refinish entire unit.

D. Existing Utilities Services:

1. Interruptions to critical existing utility services will not be allowed except as scheduled per Section 01.50.00 - Temporary Facilities and Controls.

2. The Prime Contractor shall locate and record on Drawings all existing utilities along the course of the work by such means as the Designer and the Owner may approve, and shall preserve such marked locations until the work has progressed to the point where the encountered utility is fully exposed and protected as required. It shall be the Prime Contractor's responsibility to notify the proper authorities and/or utility company before interfering therewith.

3. Existing utilities that are indicated on the Drawings or whose locations are made known to the Prime Contractor prior to excavations, though accuracy and information as to grades and elevations may be lacking, shall be protected from damage during the excavation and backfilling operations and, if damaged by the Prime Contractor, it shall be repaired by the Prime Contractor at his/her own expense.

4. All exposed conduits, wires, and/or cables shall be provided with sufficient protection and support to prevent failure, fraying, or damage due to backfilling or other construction operations.

1.13 DEBRIS REMOVAL

A. The Prime Contractor shall coordinate the removal of all demolition and construction waste including waste by all Subcontractors from the job site on a daily basis.

B. Debris shall be legally disposed of in a D.E.P. approved disposal site.

C. The Prime Contractor shall bear responsibility for maintaining the building and site clean and free of debris, leaving all work in clean and proper condition satisfactory to the Owner and the Designer. The Prime Contractor shall ensure that each of the Subcontractors clean up during and immediately upon completion of their work. Clean up includes the following tasks:

1. Remove all rubbish, waste, tools, equipment, appurtenances caused by and used in the execution of work.

D. Prevent the accumulation of debris at the construction site, storage areas, parking areas, and along access roads and haul routes.

E. Provide containers for deposit of debris and schedule periodic collection and disposal of debris.

F. Prohibit overloading of trucks to prevent spillage on access and haul routes.

G. The Prime Contractor shall be responsible for proper disposal of all construction debris leaving the site.

1.14 FIELD MEASUREMENTS

A. Although care has been taken to ensure their accuracy, the dimensions shown for existing items and structures are not guaranteed. It is the responsibility of the Prime Contractor to verify these dimensions in the field before fabricating any construction component. No claims for extra payment due to incorrect dimensions will be considered by the Owner.

1.15 SAFETY REGULATIONS

A. This project is subject to compliance with Public Law 91 596 "Occupational Safety and Health Act" latest edition (OSHA 29 CFR 1926), with respect to all rules and regulations pertaining to construction, including Volume 36, numbers 75 and 105, of the Federal Register, as amended, and as published by the U.S. Department of Labor.

B. Hazardous Waste Generation: Any work generating Hazardous or so-called Universal Wastes will comply with all requirements of 310 CMR 30.000. The proper storage, use and disposal of any hazardous chemicals or substances brought on site by the Contractor are the responsibility of Contractor. The Owner will not be responsible for any hazardous materials left on site, the cost to remove these materials will be the Contractor’s responsibility. All hazardous wastes generated as a result of demolition and remodeling shall be contained, collected, segregated, labeled per all applicable federal EPA, Massachusetts DEP, and Federal DOT regulations or other applicable local, state or federal hazardous waste regulations, pending the appropriate disposition.

1.16 OSHA SAFETY AND HEALTH COURSE DOCUMENTATION

A. OSHA Safety and Health Course Documentation Records: Chapter 306 of the Massachusetts Acts of 2004 requires that everyone employed at the jobsite must complete a minimum 10-hour long course in construction safety and health approved by the U.S. Occupational Safety and Health Administration (OSHA) prior to working at the jobsite. Compliance is required of Prime Contractors’ and Subcontractors’ on-site employees at all levels whether stationed in the trailer or working in the field. Unless the Massachusetts Attorney General’s office indicates otherwise, this requirement does not apply to home-office employees visiting the site or to suppliers’ employees who are making deliveries.

B. OSHA 10 cards for anyone working on site are to be submitted prior to the first requisition.

C. Documentation records shall be initially compiled by the Prime Contractor and Subcontractors, and the Prime Contractor shall create and maintain a copy of the documentation on site at all times.

1.17 DAMAGE RESPONSIBILITY

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

1.18 OWNER FURNISHED PRODUCTS

A. Products indicated "N.I.C." (Not in Contract), or "E. O." (Equipment by Owner), or "O.F.O.I." (Owner Furnished Owner Installed), or other similar acronyms as defined in the contract documents will be furnished and installed by the Owner. Coordination and provision of service lines for such products shall be included under these Construction Contract Documents, if indicated. Final connections from service lines to equipment will be by the Owner, unless otherwise indicated

1.19 ASBESTOS AND HAZARDOUS MATERIALS DISCOVERY

A. If unanticipated asbestos-containing materials or other Hazardous Materials not included in Contract are discovered at any time during the course of work, the Prime Contractor shall cease work in the affected areas only and continue work in other areas, at the same time notify the Designer of such discovery. Do not proceed with work in such affected areas until written instructions are received. If removal is required, payment will be made in accordance with the contract unit prices bid for each respective material. In the absence of unit prices, costs shall be negotiated or otherwise established prior to commencement of removal, in accordance with provisions of the Contract.

B. The Owner or Designer will work with the Contractor to initiate removal or encapsulation of the asbestos. An extension of the completion date may be granted equal to the time lost. Proper notification must be made to the MADEP through the ANF-001 form, and the Owner.

1.20 LIST OF DRAWINGS

T1 - Cover Sheet
A1 - Ceiling Plans
FP1 - Fire Protection Plan
FP2 - Fire Protection Details

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01.31.00

PROJECT MANAGEMENT AND COORDINATION

I. PART I - GENERAL

1.01 GENERAL PROVISIONS

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

1.02 SUMMARY

A. Without limitations, coordination will include Critical Path Method Scheduling (CPM), coordination of submittals, coordination of all elements of the Work, and coordination of contract closeout.

B. Description:

1. Coordinate scheduling, submittals, and work of the various trades and elements of the Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

2. Coordinate sequence of the Work to accommodate Partial (Beneficial) Occupancy.

C. Meetings:

1. In addition to progress meetings, hold coordination meetings and pre-installation conferences with personnel and Sub-Contractors to assure coordination of the Work. The coordination meetings are to be separate from the commissioning or commissioning meetings.

D. Coordination of Submittals:

1. Schedule and coordinate submittals.

2. Coordinate work of various trades having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

3. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other trades.

4. Contractor’s mark-up will be excluded from change orders caused by lack of coordination during design.

E. Commissioning:

1. A formal commissioning process is not required for this project, however, the Prime Contractor remains responsible for coordinating the efforts of the sub-trades responsible for installing any MEP systems on the project to assist the design engineers during the time of punchlisting, to be able to verify that the system is functional and complete.

1.03 FIELD COORDINATION

A. Project scopes of limited complexity or limited utility installation will not require coordination drawings. The Prime Contractor remains responsible for field coordinating the work of all trades, to see that it comes together without conflict or loss of functionality.

1. Where field coordination is performed, the Prime Contractor shall advise the Designers of any conflict

or field condition which results in the system being installed other than as designed.

2. In such instances, contractors are expected to propose alternative routes based on field conditions revealed through the performance of the demolition. Rerouting shall not be performed, however, until first approved by the Designers. No additional compensation will be due for field coordination efforts.

3. Where rerouting of utilities differently than designed creates a conflict with another trade, which was not forseen or properly coordinated between the contractors, the conflicting utility shall be revised at no expense to the Owner, to eliminate the conflict.

1.04 MEP COORDINATION DRAWINGS

A. Not required.

II. PRODUCTS (Not Used)

III. EXECUTION (Not Used)

END OF SECTION

SECTION 01.32.00

CONSTRUCTION PROGRESS DOCUMENTATION

I. PART I - GENERAL

1.01 GENERAL PROVISIONS

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

1.02 REQUIREMENTS INCLUDED

A. Procedures and requirements for submission and review of progress schedules and reports.

1.03 RELATED SECTIONS

A. Section 01.10.00 – SUMMARY

1. Project meetings.

B. Section 01.31.00 - PROJECT MANAGEMENT AND COORDINATION

1. Progress and coordination meetings.

C. Section 01.33.00 - SUBMITTAL REQUIREMENTS

1. Project reports.
2. Schedule of values.
3. Shop drawings, product data, and samples.

1.04 CONSTRUCTION SCHEDULE

A. Prime Contractor shall prepare and submit for Designer and Owner's information, a Critical Path Method (CPM) Progress Schedule for the work of the project. Said schedule will be coordinated with the Designer's Work Plan to include sequencing of the project work and shall be submitted within 2 weeks of pre-construction meeting.

B. In addition, the Prime Contractor shall prepare and submit at each project meeting, a two- week look-ahead schedule. The schedule shall identify:

1. Major elements of the work which were complete since the last project meeting, organized by room or by trade.

2. Major elements of the work to be performed in the next two weeks, to be able to track short-term conformance to the overall project schedule.

3. A projection of any upcoming required service interruption notices

1.05 CRITICAL PATH METHOD SCHEDULING

A. The Prime Contractor remains responsible for identifying the critical path of all project activities and milestones, and will not be entitled to any additional compensation or any additional days related to Change Order work unless it can be demonstrated that latent conditions impact the critical path.

B. The critical path schedule shall be updated and resubmitted with each Application for Payment, and shall be

considered a prerequisite for payment.

II. PRODUCTS (Not Used)

III. EXECUTION (Not Used)

END OF SECTION

SECTION 01.33.00

SUBMITTALS

I. PART 1 - GENERAL

1.01 GENERAL PROVISIONS

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

1.02 RELATED DOCUMENTS

A. This Section supplements the General Conditions.

B. Consult the individual sections of the specifications for the specific submittals required under those sections and for further details and descriptions of the requirements

1.03 GENERAL PROCEDURES FOR SUBMITTALS

A. Timeliness - The Contractor shall transmit each submittal to the Architect sufficiently in advance of performing related Work or other applicable activities so that the installation is not delayed by processing times, including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect in advance of the Work.

B. Sequence - The Contractor shall transmit each submittal in a sequence which will not result in the Architect's approval having to be later modified or rescinded by reason of subsequent submittals which should have been processed earlier or concurrently for coordination.

C. Contractor's Review and Approval - Only submittals received from and bearing the stamp of approval of the Contractor will be considered for review by the Architect. Submittals shall be accompanied by a transmittal notice stating name of Project, date of submittal, "To", "From" (Contractor, Subcontractor, Installer, Manufacturer, Supplier), Specification Section, or Drawing No. to which the submittal refers, purpose (first submittal, resubmittal), description, remarks, distribution record, and signature of transmitter.

D. Architect's Action - The Architect will review the Contractor's submittals and return them with one of the following actions recorded thereon by appropriate markings:

1. Final Unrestricted Release: Where marked "No Exceptions Taken" the Work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents.

2. Final-But-Restricted Release: When marked "Note Markings" or “Comments Attached” the Work may proceed provided it complies with the Architect's notations or corrections on the submittal and complies with the requirements of the Contract Documents. Acceptance of the Work will depend on these compliances.

3. Returned for Resubmittal: When marked "Resubmit" or "Rejected" the Work covered by the submittal (such as purchasing, fabrication, delivery, or other activity) should not proceed. The submittal should be revised or a new submittal resubmitted without delay, in accordance with the Architect's notations stating the reasons for returning the submittal.

E. Processing - All costs for printing, preparing, packaging, submitting, resubmitting, and mailing, or delivering submittals required by this contract shall be included in the Contract Sum.

1.04 OR EQUALS

A. Definition - Whenever a specification section names one or more brands for a given item, and the

Contractor wishes to submit, for consideration, another brand, the submission shall be considered an "or-equal" or a "material substitution". For the purposes of this Contract, the terms "or-equal" and "material substitution" shall be considered synonymous.

B. In no case may an item be furnished on the Work other than the item named or described, unless the Architect, with the Owner's written concurrence, shall consider the item equal to the Item so named or described.

C. The equality of items offered as "equal" to items named or described shall be proved to the satisfaction of the Architect at the expense of the Contractor submitting the substitution.

1.05 SUBMISSION OF PRODUCT DATA

A. The Contractor shall submit an electronic copy of Product Data, in Adobe Acrobat (pdf) format to the Architect. All such data shall be specific and identification of material or equipment submitted shall be clearly marked or highlighted. Data of general nature will not be accepted.

B. Product Data shall be accompanied by a transmittal notice. The Contractor's stamp of approval shall appear on the printed information itself, in a location which will not impair legibility.

C. Product Data returned by the Architect as "Rejected" shall be resubmitted until the Architects approval is obtained.

D. When the Product Data are acceptable, the Architect will stamp them “No Exceptions Taken”, and return 1 copy to the Contractor. The Contractor shall provide and distribute additional copies as may be required to complete the Work.

E. The Contractor shall maintain one full set of approved, original, Product Data at the site.

1.06 SUBMISSION OF SHOP DRAWINGS

A. Shop Drawings shall be complete, giving all information necessary or requested in the individual section of the specifications. They shall also show adjoining Work and details of connection thereto.

B. Shop Drawings shall be for whole systems. Partial submissions will not be accepted.

C. The Architect reserves the right to review and approve shop drawings only after approval of related product data and samples.

D. Shop drawings shall be properly identified and contain the name of the project, name of the firm submitting the shop drawings, shop drawing number, date of shop drawings and revisions, Contractor's stamp of approval, and sufficient spaces near the title block for the Architect's stamp.

E. The Contractor shall submit to the Architect three (3) black line prints of each shop drawing or one electronic copy in Adobe Acrobat (pdf) format, at the Architect’s discretion. Prints may be mailed, delivered in roll form or emailed. Each submittal shall be accompanied by a transmittal notice bearing the Contractor's approval stamp.

F. When the Architect returns a marked submittal with the stamp "Resubmit" or "Confirm", the Contractor shall correct the original drawing or prepare a new drawing and resubmit three prints or an electronic version thereof to the Architect for approval. This procedure shall be repeated until the Architect's approval is obtained.

G. When the Architect returns submittal with the stamp "No Exceptions Taken", the Contractor shall provide and distribute the prints for all Contractor and Subcontractors use.

H. The Contractor shall maintain one full set of approved shop drawings at the site.

1.07 SUBMISSION OF SAMPLES

A. Unless otherwise specified in the individual section, the Contractor shall submit two specimens of each sample.

B. A transmittal notice with the Contractors stamp of approval shall be included with all sample submittals.

C. Samples shall be of adequate size to permit proper evaluation of materials. Where variations in color or in other characteristics are to be expected, samples shall show the maximum range of variation. Materials exceeding the variation of approved samples will not be approved on the Work.

D. Samples that can be conveniently mailed shall be sent directly to the Architect, accompanied by a transmittal notice. All transmittals shall be stamped with the Contractor's approval stamp of the material submitted.

E. All other samples shall be delivered at the field office of the Project Representative with sample identification tag attached and properly filled in.

F. If a sample is rejected by the Architect, a new sample shall be resubmitted in the specified manner. This procedure shall be repeated until the Architect approves the sample.

G. Samples will not be returned unless return is requested at the time of submission. The right is reserved to require submission of samples whether or not particular mention is made in the specifications, at no additional cost to the Owner.

END OF SECTION

SECTION 01.50.00

TEMPORARY FACILITIES AND CONTROLS

I. PART I - GENERAL

1.01 GENERAL PROVISIONS

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

1.02 REQUIREMENTS INCLUDED

A. Temporary Facilities and Controls including the following:

1. Temporary Water.
2. Weather Protection.
3. Heating During Construction.
4. Temporary Power.
5. Hoisting Equipment and Machinery.
6. Staging.
7. Maintenance of Access.
8. Dust Control.
9. Noise Control.
10. Indoor Air Quality (IAQ) Management.
11. Enclosures.
12. Cleaning During Construction.
13. Field Offices.
14. Telephone Service.
15. Sanitary Facilities.
16. Construction Barriers.
17. Parking.
18. Debris Control and Removal.
19. Safety Protection.
20. Vehicle and Equipment Protection.
21. Shoring.
22. Construction Fence.
23. Project Identification Sign.
24. Delivery of Materials.
25. Shut Down Notice.
26. Construction Cores.
27. Covered Walkways
28. Excavations and Field Survey Requirements

1.03 TEMPORARY WATER

A. Water will be furnished by the Prime Contractor up to the point indicated on the Drawings, or within 10’-0” of the building if not indicated, for the permanent connection to the water supply system.

B. Water shall be distributed by means of connections to the permanent service lines that are to be installed at the expense of the Prime Contractor.

C. Any temporary hoses and pipe lines and connections from the permanent service lines either outside or within the building, necessary for the use of the Prime Contractor and his Subcontractors shall be installed, protected, and maintained at the expense of the Plumbing Subcontractor.

D. Temporary hoses and temporary pipe lines used for transporting water shall not be run unattended or unprotected

across parking areas, parking area entrance, walkways, plazas, or steps. Temporary hoses and temporary pipelines shall not be permitted to be installed along, through or across corridor and occupied rooms or spaces.

E. The Prime Contractor shall provide an adequate supply of drinking water from approved sources of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

F. Use of the water may be discontinued by the Owner if, in their opinion, it is wastefully used.

1.04 WEATHER PROTECTION

A. Not applicable.

1.05 HEATING DURING CONSTRUCTION

A. The scope of work will disable the building's heating system and domestic hot water system. Work is not expected to be complete before the start of the Fall Semester. The Prime Contractor must provide temporary heating as specified and indicated on the Drawings, until the permanent heating system is operation and accepted.

B. Provide a temporary domestic water heater to provide hot water from the start of the Fall 2023 semester until the permanent system is operational.

C. Provide temporary heating equipment as required to maintain heat within the building of not less than 50 degrees F., nor more than 75 degrees F., which shall be continuously maintained in the enclosed area to the extent necessary to properly progress and protect the work until the project is accepted.

1. Should heating system shutdown require temporary heating to maintain the specified temperatures, the Prime Contractor shall submit in writing to the Designer for approval, three copies of his method and time schedule for heating during construction.

2. Costs for temporary heat shall be solely the Prime Contractor's.

D. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.

E. Contractors shall have qualified personnel available 7 days a week, 24 hours a day to respond to emergencies or service or check heating equipment when required, to protect the Work and the building.

1.06 TEMPORARY POWER

A. Contractors may utilize electrical power where available in or around the Work Area, and the Owner shall pay the cost of electricity used.

1. The use of cordless tools is strongly encouraged.

2. Contractors shall provide their own electrical cords, and cords shall not be run through, across or draped within corridors or circulation spaces used by the public. If running electrical cords across circulation spaces is unavoidable, cords shall be secured to the floor with readily visible colored duct tape, and shall be removed as soon as power is no longer needed.

B. Modification of electrical panels is not permitted, except where higher voltages are required for specialty tools. Any panel modifications may only be performed by a licensed electrician, and with the Owner's approval.

C. Generators for temporary power will not be permitted.

1.07 HOISTING EQUIPMENT AND MACHINERY

A. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the work shall be furnished, installed, operated and maintained in safe condition by the individual Subcontractors and is so stated in each appropriately related Section of the Specifications. All costs for hoisting operating services shall be borne by the Subcontractors unless specifically excepted in the Contract Documents.

1. A licensed equipment manufacturer's representative shall be present at all times, to witness the erection and dismantling of all hoisting equipment and machinery, whenever such equipment is being erected or dismantled. No such work will be performed without the presence of such representative.

2. Hoisting equipment and machinery erection and dismantling shall be performed only by trained, certified, and experienced riggers qualified to perform such work.

3. Copies of such licenses and/or certifications, clearly indicating qualifications, shall be provided to the designer prior to commencement of such erecting and dismantling work.

B. Review Drawings for hoisting requirements and openness of traffic access routes to installed destinations of specified equipment and furnishings.

1.08 STAGING

A. All staging, planking and scaffolding, exterior and interior, required for the proper execution of the work and over eight feet in height, shall be furnished, installed, and maintained by the Prime Contractor.

1. Erection and dismantling of staging shall be performed only by trained, certified, and experienced staging personnel qualified to perform such work.

2. Copies of such certifications, clearly indicating qualifications, shall be provided to the Owner prior to commencement of such erecting and dismantling work.

3. All staging up to eight feet in height shall be provided by the individual Subcontractors as applicable to their work.

4. Use of staging extends to the Owner's contractors as may be listed in Section 01.11.00 - Summary of Work, where applicable.

1.09 MAINTENANCE OF ACCESS

A. The Prime Contractor shall provide and maintain for the duration of his contract, a means of access to, around and within the site, as indicated on the Contract Drawings, for vehicular traffic and authorized personnel. This means of access shall be construed to sustain the weight of equipment customarily engaged for use in construction projects of this type and magnitude. The Prime Contractor shall, without additional compensation from the Owner, furnish labor and materials as may be required from time to time to maintain this means of access in an acceptable condition as determined by the Designer. Pedestrian access shall provide adequate protection against falling debris, slippage, adequate lighting, warning and directional signs, and protection against construction activities.

1.10 DUST CONTROL

A. The Prime Contractor shall have all Subcontractors provide adequate means for the purpose of preventing dust caused by construction operations from creating a hazard, nuisance, and from entering adjacent occupied areas throughout the period of the construction contract.

B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions set forth in the Contract Articles with added regard to performance obligations of the Prime Contractor.

1.11 NOISE CONTROL

A. Work must be scheduled and performed in such a manner as to not interfere with the operations of the Owner. Construction work that is deemed by the Owner to be excessively noisy may be required to be done during non-normal working hours and at no additional expense.

B. Comply with requirements of authorities having jurisdiction. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

C. Execute construction work by methods and by use of equipment which will reduce excess noise.
   1. Equip air compressors with silencers, and power equipment with mufflers.
   2. Manage vehicular traffic and scheduling to reduce noise.
   3. No heavy equipment may be started or idled before 7A.M.

1.12 INDOOR AIR QUALITY (IAQ) MANAGEMENT

A. Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke. At a minimum, take the following measures:

   1. Prohibit smoking in the building.
   2. Locate exterior designated smoking areas away from entries, outdoor air intakes, and operable windows.

B. During Construction:

   1. During construction meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, Chapter 3, November 2007.

   2. Protect stored on-site and installed absorptive materials from moisture damage.

1.13 ENCLOSURES

A. Provide temporary, insulated, weather tight closures of openings in exterior surfaces for providing acceptable working conditions and protection for materials, allowing for heating during construction, and preventing entry of unauthorized persons. Provide doors with self-closing hardware and locks.

B. All utilities including electric ducts, conduits, telephone lines, sprinklers, and other utilities shall be protected against damage from construction activity. The Prime Contractor shall be responsible for all damage to the utilities from construction and shall repair all such damage at no additional cost to Owner.

C. Provide temporary partitions and/or ceiling as required to separate work areas from occupied areas, to prevent penetration of dust and moisture into occupied areas, to prevent damage to existing areas and equipment. Construction shall be framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces; (STC rating 35 in accordance with ASTM E900. Flame Spread Rating of 25 in accordance with ASTM E84.)

1.14 CLEANING DURING CONSTRUCTION

A. Unless otherwise specified under the various Sections of the Specifications, the Prime Contractor shall perform clean-up operations during construction as herein specified.

B. Control accumulation of waste materials and rubbish; periodically dispose of off-site in a legal manner. The Prime Contractor shall bear all costs, including fees resulting from such disposal.

C. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finish operations.

D. Clean all dirt and debris tracked into other buildings by construction personnel, to the satisfaction of the Owner.

E. Maintain project in accordance with all local and Federal Regulatory Requirements.

F. Store volatile wastes in covered metal containers, and remove from premises.

G. Prevent accumulation of wastes which create hazardous conditions.

H. Provide adequate ventilation during use of volatile or noxious substances.

I. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Identify potential sources of cleaning water runoff and propose abatement procedures.

J. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

K. Use only those cleaning materials and methods recommended by manufacturer of surface materials to be cleaned.

L. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.

M. Provide on-site containers for collection of waste materials, debris, and rubbish.

N. Remove waste materials, debris and rubbish form the site periodically and dispose of at legal disposal dump site (DEP approved). Recycle where possible.

O. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

P. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.15 FIELD OFFICES

A. Contractors may utilize space on site for a field office trailer if they so choose. The Owner may allow limited usable space, within the building, as field offices for the contractors.

B. If provided by the Prime Contractor the office trailer shall be relocated if required by the Owner, and shall be secured to the site as required by the Building Code.

1.16 TELEPHONE SERVICE

A. Wired telephone service to the office trailer or project site is not required, although contractors may elect to have such service at their own expense.

B. All Designers, Superintendents and Project Managers shall maintain cellular telephones and be reachable Monday - Friday between 8AM and 5PM, and after hours for emergency calls. Phone numbers shall be listed on a Project Directory, to be submitted at the pre-construction meeting.

1.17 SANITARY FACILITIES

A. Use of toilet facilities within the building is allowed, during the times that school is out of session. Once school resumes, and students return to the bulding, exterior chemical toilets must be provided by the contractor.

B. Chemical toilets and their maintenance shall meet requirements of state and local health regulations and ordinances and shall be subject to the approval the Owner.

C. If the Contractor uses public toilet rooms on site, the Prime Contractor shall take responsibility for maintenance and cleaning of such areas and shall leave them in first class condition equal to the accepted conditions of toilet facilities not used for construction personnel.

1.18 CONSTRUCTION BARRIERS

A. Proper construction barriers shall be provided around the contract work areas as defined by the Contract Drawings or as directed by the Owner.

B. Construction barriers shall consist of traffic cones, ribbons, tapes, secure fencing, trench covers, wood barriers, warning signs, directional signs, and other traffic materials to keep traffic and people from area of construction and maintain ongoing operations.

C. Barriers shall be erected at such approved locations as are necessary, sufficiently cross-braced and supported adequately from floors and ceilings as required.

1.19 PARKING

A. During Summer vacation, contractors may park freely within the School's parking lot. After classes resume in the Fall, contractor's shall park where directed.

B. Contractor's shall park where directed by the Owner, and move vehicles when requested by the Owner.

1. Access to loading docks, driveways, staff, faculty, visitor or tenant parking shall not be blocked by construction vehicles.

2. Parking in handicapped accessible spaces will not be permitted.

C. Idling of vehicles on site will not be permitted.

D. If the Owner authorizes parking on lawns, the Prime Contractor shall be responsible for repairing any damage to lawns or curbs from parked vehicles.

1.20 DEBRIS CONTROL AND REMOVAL

A. Debris shall not be permitted to accumulate or migrate and the work shall at all times be kept satisfactorily clean. Facility trash receptors shall not be used for the disposal of debris. Dumpster shall be provided by the Prime Contractor for removal of debris for all Subcontractors.

B. Remove debris from the work site on a daily basis and dispose of same at any (private or public) DEP approved dump that the Prime Contractor may choose providing that the Prime Contractor shall make all arrangements and obtain all approvals and permits necessary from the owner or officials in charge of such dumps. During disposal process, copies of daily receipts from dumpsite shall be submitted on a regular basis.

1.21 SAFETY PROTECTION

A. At no time shall the work be left unattended without proper safety protection and shall not be left unprotected to the weather and accessible to the public. It is the responsibility of the Prime Contractor to maintain proper safety protection for the public while work is in progress or unattended.

1.22 VEHICLE AND EQUIPMENT PROTECTION

A. All construction activities shall be performed in such a manner so as not to dust, stain or damage any building elements, equipment, vehicles, etc. within general vicinity of the construction work area. Any damage to these items shall be cleaned and repaired at the expense of the Prime Contractor.

1. All construction vehicles and equipment on site shall be effectively disabled and secured when not in use.

1.23 SHORING

A. The Subcontractors shall provide all temporary shoring and bracing as required for the proposed work. Comply with all applicable codes and standards.

1.24 CONSTRUCTION FENCE

A. A construction fence shall be provided at all areas where work is being performed and at all pedestrian walkways throughout construction. Fencing shall be kept in good repair at all times, and shall be arranged to maintain ongoing operation's access and egress.

B. Maintain pedestrian passages between the construction site and adjacent buildings.

C. Construction fences shall be six feet high and of chain link, or approved equal, erected in a substantial manner, straight, plumb and true as approved by the Designer.

D. Gates shall be built into fence at such approved locations as are necessary, well cross-braced and hung on heavy strap hinges with proper post and hook for double gates. Provide heavy hasps and padlocks for each gate. Provide a set of keys for each lock to Owner to facilitate emergency access.

E. Fencing shall be removed by the Prime Contractor at no cost to the Owner at such time before final completion as the Designer directs. Restore site to acceptable condition after removing fence.

1.25 PROJECT IDENTIFICATION

A. No project sign is required by the Owner.

B. If the Contractor wishes to provide a project sign, at his own expense, the Owner reserves the right to approve the content and appearance of the sign.

C. Any signs will be located on site where directed by the Owner, and shall be relocated or removed if the Owner so directs.

1.26 DELIVERY OF MATERIALS

A. All Materials shall be delivered to the Contractor's or Sub-Contractor's warehouse or may be delivered to the site if the Contractor's representative is present to receive them.

B. No materials will be received by the Owner's personnel.

1.27 SHUT DOWN NOTICE

A. The Contractor shall notify the Owner, at least seven (7) calendar days in advance, of the need for any utility shut down to install or modify any utilities or building systems. The shutdown request shall indicate:

1. The utility to be shutdown.
2. The duration of the shutdown.
3. The spaces anticipated to be affected by the shutdown.

B. Investigation of the existing systems to determine the areas served, the location of isolation valves or sub-panels, etc., is to be anticipated and included in the bid scope.

C. Shutdowns involving sprinkler systems or fire alarm systems, for which the Authority Having Jurisdiction (AHJ) requires a fire watch, the contractor performing the shutdown shall provide and pay for the fire watch at no additional cost to the Owner.

D. Utility shutdowns affecting other buildings will be limited to occur after normal working hours. No additional compensation will be paid for overtime.

1.28 EXCAVATIONS AND FIELD SURVEY REQUIREMENTS

A. Not applicable.

II. PART II - PRODUCTS (Not Used)

III. PART III - EXECUTION (Not Used)

END OF SECTION
01.50.00

SECTION 01.73.29

CUTTING AND PATCHING

I. PART-1 GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS, which are hereby made a part of this section of the specifications.

1.02 SCOPE OF WORK

A. The Prime Contractor shall coordinate the work to ensure that all embedded or concealed items are placed prior to the closing of construction. Where opening up construction is required to install any aspect of the work, the Prime Contractor shall be solely responsible for the cutting and patching of such materials.

1.03 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching.

1.04 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

B. Obtain approval of the cutting and patching proposal from the Designer before cutting and patching structural elements.

C. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Designer's opinion, reduce the building's esthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.05 RELATED SECTIONS

A. Section 05.25.00 - Agreement
B. Section 00.73.00 - Special Conditions

II. PART 2 - PRODUCTS

2.01 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. Ceiling Tiles: Remove and replace existing ceiling tiles where indicated, to the extent required to install the new work. This shall include grid and suspension wire if so required.

1. Ceiling tiles which become damaged by their removal shall be replaced with new to match the appearance of the existing surrounding tiles.

2. Hanger wire which is cut, shall be replaced in full. Cut wires are not allowed to be mended by twisting them back together.

C. Lumber: where cutting of lumber is required for the installation of utilities, new materials used to patch, sister, header or box out openings shall be kiln dried, stud grade S-P-F dimensional lumber with a dressed size of 1½" x the depth of the members receiving the work.

1. Use pressure treated lumber when in contact with ground, masonry, concrete or for roof blocking, with CCA preservative and a minimum retention rate of 0.25 pcf. Treat all cut ends by touching up in field with preservative. Use only galvanized fasteners and separate from materials which will react with preservative by using a separation sheet of peel-and-stick bituminous flashing tape.

III. PART 3 - EXECUTION

3.01 PROTECTION

A. Protect existing trees, plants, roads, walls etc. to remain. Special protection of any lawns and planting around buildings is the responsibility of the Contractor. Contractor will replace any planting killed or damaged by construction operations.

3.02 LEAD-CONTAINING PAINT

A. All Contractors shall be made aware that lead-containing paint is present on architectural components to be affected by the renovation work under the Contract.

B. With regards to renovation work performed under this project, abatement of lead-containing paint by a licensed Lead Abatement Contractor in accordance with Massachusetts Department of Public Heatlh (DPH) 105 CMR 460.000 Regulations will not be required.

C. However, all work shall be subject to compliance with Massachusetts Department of Labor and Workforce Development (DLWD) 454 CMR 22.00 Regulations. Specifically, Section 454 CMR 22.11 - "Work Practices and Other Requirements for Renovation Work" shall be adhered to when performing all renovation work that disturbs lead-containing components.

D. In addition to those requirements, the all Contractors working at the site shall also comply with the OSHA "Lead in Construction Standard at 29 CFR 1926.62 as well as properly dispose of all material that contains lead in accordance with applicable Massachusetts Department of Environmental Protection (DEP) and federal EPA Regulations.

E. All Contractors working at the site shall also be certified in accordance with the Environmental Protection Agency (EPA) 40 CFR Part 745 Regulations – “Renovation, Repair and Painting Rule” and comply with all provisions therein.

F. Prior to the start of the work, the Prime Contractor shall be required to provide a written description (i.e. submittal) that details the means and methods to achieve compliance with the provisions outlined herein.

3.03 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

2. Take all precautions necessary to avoid cutting existing pipe, conduit or duct work serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

C. Furnish dropcloths, erect dust partitions and take other measures as required to control dust generated by cutting activities and prevent its spread to adjacent areas

3.04 PERFORMANCE

A. The Prime Contractor shall be responsible for all cutting and patching, including all cutting and patching required by sub contractors.

1. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

2. Before proceeding, meet at the 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.

B. Firestopping, where required, shall be performed by the trade penetrating the wall, floor or ceiling. At all other areas requiring firestopping, work shall be performed by the Prime Contractor.

C. General: Employ skilled workmen to perform cutting and patching. Where required to maintain an existing product or system warranty, such as a roof warranty, employ a manufacturer's approved and warranted Contractor to perform the cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

D. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

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

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or diamond core drill.

E. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. 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.

2. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

3. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat. Touch-up painting may stop at a corner, pilaster or other visual break in the repaired surface.

4. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

F. Site Repair:

1. Restore all lawns, plantings, trees to their original condition.

2. Repair all walkways and driveways that were damaged due to construction.

3.05 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature.

B. Clean any portions of the building which were affected by dirt or dust generated by cutting, sanding or other construction activities.

END OF SECTION

SECTION 01.77.00

CLOSEOUT PROCEDURES

I. PART 1 - GENERAL

1.01 SCOPE

A. This section lists the procedures required for the proper completion of this project including processing the Release of Retainage and making the Final Payment to the Contractor.

B. Consult the Individual sections of the specifications for requirements affecting Project Close Out.

1.02 RELATED DOCUMENTS

A. This section supplements the General Conditions.

B. Consult the individual sections of the specifications for specific items required under those sections.

1.03 SUBSTANTIAL COMPLETION

A. Prior to requesting Substantial Completion the Contractor shall make a thorough inspection of the Work. During this inspection the Contractor shall prepare a comprehensive list of all items remaining to be completed or corrected. This list shall include all remaining Contractor and Subcontractor items to be provided under the Contract Documents.

B. Upon completion of the items noted on the Contractor's list the Contractor shall notify the Architect that the Work is Substantially Complete. The Architect shall then conduct a similar thorough inspection. If the Architect agrees that the Work is Substantially Complete, the Architect will promptly make a thorough inspection and prepare a punch list, setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable or incomplete. The Contractor shall coordinate all Subcontractors to achieve prompt completion of the punch list.

C. The Contractor shall not be relieved of the responsibility to provide Contract items left off of the Architect's punch list.

D. If the Architect determines that the Work is not Substantially Complete, the Architect shall inform the Contractor of those items that must be completed before the Architect will prepare a punch list. Upon completion of those items, the Contractor shall again request the Architect to prepare a punch list.

E. When the punch list has been prepared, the Architect will arrange a meeting with the Contractor and Subcontractors to identify and explain all punch list items and answer questions on work which must be done before final acceptance.

F. The Architect may revise the punch list, from time to time, to ensure that all items of Work are properly completed.

G. The Architect shall prepare the Certificate of Substantial Completion in accordance with the General Conditions.

H. The Contractors shall correct the items noted on the punchlist(s). The General Contractor shall check the work of his forces, and of all sub-contractors to verify that the work has been corrected, and notify the architect that the project is ready for reinspection. The Architect and Engineers may, at their discretion, check the work to confirm the punchlist has been completed, and advise the Owner.

1. If the Contractor calls for reinspection, and the Project is not actually ready or punchlist items have not been corrected and subsequent reinspections are required, the Architect reserves the right to bill

the Owner for the reinspections, and such monies will be deducted from the balance due to the Contractor.

1.04 RECORD DRAWINGS

A. As-built Drawings shall consist of all the Contract Drawings. As-built Drawings shall be kept up-to-date. Information from on-going Work shall be recorded on As-built Drawings within 48 hours of Work being performed.

B. The General Contractor and each Subcontractor shall be required to maintain one set of As-built Drawings, as the work relates to their Sections of the Specifications, at the site.

C. The As-built Drawings shall be stored and maintained in the General Contractor's field office or a secure location apart from other documents used for construction. The As-built Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.

D. As-built Drawings, as submitted by the General Contractor shall be verified in the field by the Designer or his Consultants. Verification by the Designer shall occur during the construction process and prior to the related work being completed and covered up.

E. The As-built Drawings shall be available at all time for inspection by the Project Manager or Designer. All deficiencies noted shall be promptly corrected.

F. The following information shall be indicated on the As-Built Drawings:

1. Record all changes, including change orders, in the location, size, number and type both horizontally and vertically of all elements of the project which deviate from those indicated on all the Contract Drawings.

2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the As-built Drawings shall be plus or minus two (2) inches.

3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.

4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, cleanouts, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps and maintenance devices. The location of these internal utilities, appurtenances, and devices shall be shown by offsets to the column grid lines on the Drawings, or marked accurately on the as-built reflected ceiling plans.

5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the As-built Drawings.

G. At the end of each month and before payment for materials installed, the General Contractor, each Subcontractor, the Architect and Project Manager shall review the As-built Drawings for purpose of payment.

1. If the changes in location of all installed elements are not shown on the As-Built Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

H. Prior to the installation of all finish materials, a review of the As-built Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as determined by the Designer.

I. At the completion of the contract, each Subcontractor shall submit to the General Contractor a complete set

of his respective As-built Drawings indicating all changes. After checking the above drawings, the General Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the As-built Drawings to the Designer.

J. The original hand-noted as-Built Drawings shall be scanned in color to Adobe Acrobat (*.pdf) format and submitted on CD or DVD to the Designer, to be added to the complete plans as constructed.

1.05 RECORD SURVEYS

A. Not Required.

1.06 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Consult the individual sections of the specifications for the specific requirements for those sections and for further details and descriptions of the requirements.

B. Prior to final payment and completion the Contractor shall provide all Operating Manuals and Maintenance Instructions as required by the Contract Documents.

C. Operating Instructions and Manuals:

1. Subcontractors, installers, and suppliers shall furnish to the Contractor two sets of operating and maintenance instructions of all mechanical, electrical, and manually operated equipment furnished and installed by them. Mechanical and electrical subcontractors shall furnish instructions as specified in their respective sections.

2. The Contractor shall collect all of the above instructions, bind them into two complete sets, and submit them to the Architect who will deliver them to the Owner.

3. The Contractor shall prepare a CD of all O&M items and deliver to the Owner.

4. Submission of operating and maintenance instructions shall be a condition precedent to final payment

D. Instruction of Owner's Personnel

1. Where specified in the individual sections of the specifications, the Contractor and Subcontractor shall instruct the Owner's personnel at the site, in the use and maintenance of equipment installed under the Contract.

2. Submission to the Architect of a certificate of compliance to this requirement, signed by the Contractor and the Owner's Representative, shall be a condition precedent to final payment.

1.07 PARTIAL RELEASE OF RETAINAGE

A. If within 65 days after Substantial Completion, any of the items on the Architect's punch list are not complete or if the Contractor has not provided the appropriate marked up As Built Drawings, Operating Manuals, Warranties, Guarantees, or Spare Parts the Architect shall assign a monetary value for each incomplete item as well as any other items as provided by M.G.L. c.30 §39K, and the Architect shall prepare a Certificate for Partial Release of Retainage

B. If the Architect is required to prepare a Certificate for Partial Release of Retainage the Contractor shall complete all remaining Work in accordance with the provisions of the General Conditions.

C. The Contractor's signature on this Certificate shall be notarized.

D. The Contractor may make a request for additional releases of retainage when portions of the Work listed on the Architect's punch list have been satisfactorily completed. Each request shall be accompanied by a new

application for payment and a new signed and notarized Certificate for Partial Release of Retainage.

E. The Architect's inspections, required to complete the additional payment applications described above, are subject to provisions of the General Conditions.

F. If the Owner has required Performance and Payment Bonds, then prior to the partial release of retainage, the General Contractor shall submit to the Owner Consent of Surety to Partial Release of Retainage using AIA Document G707A or an equivilent document.

1.08 FINAL RELEASE OF RETAINAGE

A. Prior to the final release of retainage, the General Contractor shall submit to the Owner:

1. Consent of Surety, using AIA Document G707 or similar document, if performance and payment bonds were required for the project.

2. Contractor's Affidavit of Release of Liens, using AIA Document G706A or equivalent. This document shall be accompanied by certified statements from all sub-contractors working on the project, that they have received all monies due, and have paid all suppliers and sub-sub contractors accordingly.

(a) Should any payments be outstanding and contingent upon receipt of the retainage in order to be paid, the General Contractor shall submit AIA Document 706, itemizing those items which have not been paid.

END OF SECTION

SECTION 01.78.39

PROJECT RECORD DRAWINGS

I. PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. This section specifies the requirements for maintaining and preparing Projects Record Drawings during and at the completion of the Work.

B. Record Drawings shall consist of all the Contract Drawings.

1.02 RELATED DOCUMENTS

A. This section supplements the General Conditions.

B. Consult the individual sections of the specifications for cleaning of Work installed under those sections.

1.03 PROCEDURES DURING CONSTRUCTION

A. From the sets of drawings furnished by the Owner, the Contractor shall reserve one set for record purposes. From this set, the Contractor shall detach and furnish, at no charge to Subcontractors the drawings of their portion of the Work for the same purpose.

B. The Contractor and Subcontractors shall keep their marked up As Built set on the site at all times and note on it in colored ink or pencil, neatly and accurately, at the end of each working day, the exact location of their work as actually installed. This shall include:

1. The location and dimensions of underground and concealed Work, and any architectural, mechanical, or electrical variations from the Contract Drawings.

2. All changes, including those issued by Addendum, Change Order, or instructions by the Architect shall be recorded.

C. Marked up As Built drawings shall be prepared for the entire project and include all Work, including but not limited to:

1. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) foot intervals and at all changes of direction.

2. The location of all internal utilities and appurtunces, concealed by finish materials, including but not limited to valves, coils, dampers, vents, cleanouts, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps, and maintenance devices.

3. The location of these, items shall be shown by offsets to structure and drawing grid lines.

D. The tolerance for the actual location of these items on the marked up As Built Drawings shall be plus or minus two (2) inches.

E. Each item shall be referenced by showing a tag number, areas served, and function on the marked up As Built drawing.

F. The Architect may periodically inspect the marked up As Built drawings at the site. The proper and current maintenance of the information required on these drawings shall be a condition precedent to approval of the monthly applications for payment.

1.04 SURVEYS

A. Not required.

1.05 PROCEDURES AT COMPLETION

A. At Substantial Completion the Contractor shall submit the complete set of marked up As Built drawings to the Architect, scanned in color to PDF format. The Contractor shall check all marked up As Builts prepared by subcontractors and certify in writing on the title sheet of the drawings that they are complete and correct, prior to submission to the Architect.

B. The Architect shall review the marked up As Built drawings and verify by letter to the Owner that the Work is complete.

C. The Contractor may make a written request for copies of the completed Record Drawings. The Contractor shall reimburse the Owner directly for the cost of printing of any requested Record Drawings.

D. Submission of accurate marked up As Built drawings and their approval by the Architect shall be a condition precedent to final payment.

END OF SECTION

SECTION 22.00.00

PLUMBING

(Filed Sub-Bid)

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. Attention is directed to the general and supplementary conditions and Division 1 including all sub-divisions thereof as listed in the table of contents, which are hereby made a part of this Section.

B. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction.

1.02 FILED SUB-BID REQUIREMENT

A. The Work of this Section is stipulated as a Filed Sub-Bid under Paragraph D, Item 2 of the Form for General Bid.

B. The Sub-Bidder of this Section shall submit Section 00.41.13.16 – Sub-Bid Form as required by Section 44F of Chapter 149 of the General Laws, as amended.

C. The Sub-Bidder of this Section is directed to Section 00.21.13 - Instructions to Bidders. All Sub-Bids shall be filed with the Awarding Authority in accordance with requirements stipulated therein.

D. The Work of this Filed Sub-Bid shall include the Work of the following Specification Sections:

   a. Section 22.00.00 – Plumbing

E. The Sub-Bidder of this Section shall examine their respective Drawings and all Sections of their Specification for requirements affecting the Work of this Section. The Work of this Section is shown primarily on the following listed Drawings:

   a. DM-1 – Boiler Room Mechanical Demo Plans

   b. M-1 – Boiler Room Mechanical Plans

   c. M-2 – Schedule & Details

F. Sub-Sub-Bid Requirements: N/A

1. The Sub-Bidder of this Section shall list in Paragraph E of the "Form of Sub bid" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub trade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub bidders, after sub bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

   a. Insulation.

1.03 SCOPE

A. Perform work and provide material and equipment as required for a complete and operational plumbing system as shown on the Drawings and as specified in this Section. Completely coordinate with work of other trades and provide for complete and fully functional installation.

B. The work shall include, but is not limited to, the following major items of work:

1. Demolition and removal of the existing oil-fired water heater and mixing valve assembly as well as selective demolition.

2. Furnish and install indirect-fired water heaters and associated domestic water piping, valves and accessories as shown on the plans and/or reflected herein.

3. Furnish and install a temporary electric water heater to support domestic hot water heating needs after August 20th until LP gas water heating system is operational.

4. Provide an electronic mixing valve as specified and shown on the drawings and associated control wiring.

5. Provide all LP gas piping, gas vents and associated valves and accessories.

6. Provide new valves and piping as indicated on the drawings.

7. Provide new pipe insulation on existing disturbed piping and all new piping. Provide pipe supports for all gas, gas vent and domestic water piping.

8. Provide all coring, cutting and patching of the work required of this section.

9. Obtain all permits and approvals required for work under this Section.

C. The work of this section is shown on drawings DM-1, M-1 & M-2.

1.03 COORDINATION

A. Before starting work, visit site and examine conditions under which work shall be performed including preparatory work by others. Report conditions which might adversely affect the work in writing to the Engineer/Architect. Do not proceed with the work until the defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as acceptance of preparatory work and existing conditions.

B. Completely coordinate with work of other trades and provide for complete and fully functional installation. Although not specifically shown, provide supplementary or miscellaneous items, devices, appurtenances, and materials incidental to or necessary for sound, secure and complete installation.

C. The school must have domestic hot water available during normal occupied school days. If the contractor intends to perform any shutdown work during normal school hours, a temporary domestic hot water supply must be provided. The contractor shall perform the shutdown and changeover work during the schools summer shutdown between **June 20th and August 20, 2023**. If work shall occur after August 20th, plumbing contractor must furnish and install a temporary electric hot water heater as shown on the plans and specified herein. The heating boilers must be operational no later than **October 15, 2023.**

D. All new components must be flushed and sanitized as described in paragraph 3.09. Any extended shutdown of the hot water system shall require the system be flushed with 140F water for at least 12 hours. During this time maintain recirculation pumps operational and ensure no building occupants use the fixture until sanitation is complete and system is set for normal operation.

E. All contractors working on site must be CORI & SORI checked.

1.04 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect work of this Section.

B. Other specification sections which directly relate to the work of this Section include, but are not limited to, the following: N/A

C. The following related work will be performed by other Divisions of the specifications:

1. Electric power wiring for all equipment. Control wiring shall be performed by this Section.

1.05 CODES, STANDARDS AND AUTHORITIES

A. Perform all work in strict accordance with all rules, regulations, standards, codes, ordinances and laws of local, state and Federal governments, and other authorities having lawful jurisdiction, and be responsible for compliance therewith. Such authorities include but are not limited to the following: NFPA, OSHA, AGA, & EPA.

B. Give notices, file plans, obtain licenses and permits, pay fees and back charges and obtain necessary approvals from authorities having jurisdiction.

C. Material and equipment shall be Underwriters' Laboratories (UL) listed for the service for which it is being used.

D. Whenever two or more codes, regulations, etc., conflict with each other or with the Contract Documents, the more severe requirements shall govern the conduct of the work.

1.06 GUARANTEE

A. Guarantee work performed under this Section in accordance with Division 1, General Requirements. Operation of systems or equipment for temporary services does not constitute beginning of guarantee period.

B. The Contractor also agrees to furnish service of the equipment for the above period, such service to be rendered quickly and promptly at the request of the Owner. This shall not be misconstrued to include routine maintenance.

C. The Contractor shall guarantee every component part of each system for a minimum of one year, parts and labor included. The contractor shall also provide the Owner with factory warranties for all equipment inclusive of a 10-year warranty on the water heater heat exchangers.

1.07 CONTRACT DOCUMENTS

A. Plumbing drawings do not limit responsibility of determining full extent of work required by Contract Documents. Locations shown on drawings shall be checked against construction proper.

B. Drawings are diagrammatic and indicate general arrangement of systems and work of this Contract.

1.08 DISCREPANCIES IN DOCUMENTS

A. Where Drawings or Specifications indicate discrepancies or are unclear, the bidder shall advise the Engineer/Architect in writing before award of Contract. Otherwise, Engineer’s/Architect's

interpretation of documents shall be final and no additional compensation shall be permitted due to discrepancies or unclear items.

B. Where Drawings or Specifications do not coincide with recommendations of the manufacturer of a material or piece of equipment, this shall be brought to the attention of the Engineer/Architect in writing before installation of item in question. Otherwise, make changes in installation as Engineer/Architect requires without additional cost to the Owner.

1.09 RECORD DRAWINGS

A. Maintain record drawings during construction in accordance with the General Conditions of the Contract.

1.10 SUBMITTALS

A. Submit five copies of shop drawings and product data to Engineer/Architect for approval. Any deviation from the Contract Documents, or proposed substitution of materials or equipment for those specified, must be requested by the Contractor in a separate letter, whether the deviations are due to field conditions, standard shop practices or other cause. Where any deviation or substitution is permitted, the Contractor shall fully coordinate all related changes to Architectural, Structural, Fire Protection, HVAC, Electrical or other work, and shall accomplish these related changes at no additional cost to the Owner.

B. Submit shop drawing or product data for the following:

1. Domestic water piping, valves and accessories.
2. LP gas and gas vent piping, valves and accessories
3. Indirect-fired water heater.
4. Mixing valve (Alternate #1).
5. Pipe insulation.
6. Electrical wiring & devices.

1.11 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Prior to the final inspection, the Plumbing Contractor shall provide to the Engineer/Architect three (3) sets of operating and maintenance instructions. The Engineer/Architect shall review the instructions for completeness prior to turning them over to the Owner.

B. Instructions: The Contractor shall provide qualified, factory-trained manufacturers' representative to give detailed instruction to assigned Owner personnel in the operation and complete maintenance for all equipment. All such training will be at the job site.

PART 2 - PRODUCTS

2.01 PRODUCTS CRITERIA

A. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 10 years. See other specification sections for any exceptions.

B. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

D. Asbestos products or equipment or materials containing asbestos shall not be used.

E. Plumbing equipment and valves shall each have a Massachusetts Plumbing Board product approval number which can be found on the Acceptable Plumbing Products website. The Plumbing Contractor will be expected to produce the approval numbers for any and all equipment, fixtures and valves during the submittal process and at installation for anyone who asks (i.e. the Plumbing Inspector, Plumbing Engineer, etc…). Products without a Massachusetts Plumbing Product Approval code will be rejected and will not be allowed on the job-site. Plumbing product approval numbers shall be included in the close-out documents. Water piping is not required to be MA Plumbing product approved as it is not listed on the website.

2.02 INDIRECT-FIRED WATER HEATER (IWH-1)

A. Furnish and install one (1) indirect fired domestic water heaters similar to Lochinvar #STU150A or equal by TurboMax. Water heater shall have a 125-gallon storage capacity. See schedule on drawings for performance requirements. Tanks shall be ASME rated.

B. The water heaters shall be equipped with a #316L stainless steel potable water coil in the form of parallel helicoidal lines with a maximum operating pressure of 150 psi. All potable water way components will adhere to the NSF 61 standard from the NSF International Standard Drinking Water Systems Components Health Effects document. All water way components shall be lead-free. The water heater shall be equipped with a patented steel injector, located on top of the tank, to act as a boiler water inlet (primary circuit), and with a steel collector, located at the bottom of the tank, to act as a boiler water outlet. The tanks shall be made of high-carbon steel. All joints shall be arc-welded using a MIG/argon process. The tank shall have a maximum operating pressure of 150 psi and shall undergo a 300 psi hydrostatic test. The tank shall be wrapped in a 2” thick HCFC foam insulation jacket limiting thermal loss to 1/2°F per hour. The outer shall be epoxy-coated. The water heater shall be equipped with a thermostat (aquastat) that makes contact when the temperature falls below the tank water temperature set point minus an adjustable differential (10 to 40°F) and breaks contact when the temperature rises over the set point (95 to 195°F). The tank shall be equipped with a brass drain cock with a maximum operating pressure of 150 psi. Three adjustable supports shall allow the leveling of the unit. The boiler shall be shipped from the plant equipped with a safety relief valve as per the ASME code, adjusted to a 50 psi setting, a thermo-manometer and an automatic air bleeder. The water heater is protected by a 10-year warranty. The water heater shall be ASME rated.

C. Provide vacuum breakers and temperature/pressure relief valve conforming to Massachusetts Plumbing Code.

2.03 TEMPORARY ELECTRIC WATER HEATER, EWH-1

A. Water heaters shall be electric type of the capacity shown on the drawings. Tank shall be glass-lined with minimum R-16 foam insulation; rated 150 psig maximum working pressure; cathodic protection anode rod.; brass drain valve with hose connection; ¾” tap for relief valve; U.L. listed

B. Provide automatic shutoff device for excessive tank temperature. Heater shall be certified to meet ASHRAE Standard 90-A. Initial tank water temperature shall be set to 125°F.

C. Heaters shall be provided with a manufacturer’s warranty of at least 3 years based on commercial use.

D. Provide vacuum breakers and temperature/pressure relief valve conforming to Massachusetts Plumbing Code.

2.04 PIPE MATERIALS

A. All hot water, cold water, tempered water and hot water recirculating piping within the building shall be hard copper Type "L" seamless drawn tubing assembled with sweat fittings. All solder used shall be lead free, cadmium free, "Silverbrite - 100," or approved equal, complying with the latest issue of ANSI A-5.8 publication. All exposed runs to all toilet fixtures, sinks and kitchen equipment shall be chrome plated.

1. Mechanical grooved pipe couplings, fittings, Mechanical T's, and other products are acceptable to be used on piping systems and mechanical equipment connections 2"diameter and larger (in lieu of welded/flanged and threaded methods) in systems specified. Operating conditions not to exceed -30°F to 250°F temperature range according to the gasket lining selected and working pressures as shown in the coupling manufacturer's current product specifications.
   a) Copper Piping Systems: Grooved piping products for use with ASTM B88 hard Type L copper tubing shall be copper tubing sized. (Flaring of pipe ends to IPS dimensions is not allowed.) Fittings shall be ASTM B75 or B152 wrought copper or ASTM B584-87 bronze sand casting. Couplings shall be ASTM A395 and A536 ductile iron, with angle pattern bolt pads for rigidity upon visual confirmation of metal-to-metal bolt pad contact with no torque requirement. Coupling housings coated with copper colored alkyd enamel. Gaskets shall be Style "EHP" EPDM grade to suit the intended service. Gaskets used on potable water systems shall be EPDM, UL classified in accordance with ANSI / NSF61 for both hot (180F) and cold (86F) potable water service.

2. Press Fitting: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-Rings for copper press fittings shall be EPDM.
   a. Manufacturers of Copper Press Fittings:
      Viega, 17545 Daleview Dr., Lakewood, OH 44107, (877) 620-0016;
      Rigid Tool Company, 400 Clark Street, Elyria, OH 44035, (800) 519-3456;
      Elkhart Products Corporation "Xpress Press-Connect Fittings", 1255 Oak Street, Elkhart, Indiana 46515, (800) 284-4851
      Nibco Press System, 1516 Middlebury Street, Elkhart, IN 46516-4740, (800)234-0227
      Conex Banninger >B< Press, IBP Group, LLC, (904) 217-4970

3. Vic-Press 304™ Fittings: In lieu of alternate piping methods, Vic-Press 304™ may be used on piping systems 1/2" through 2" in size. Pipe shall be ASTM A312 .Schedule 10 type 304/304L stainless steel.. Fittings and couplings shall be precision cold drawn austenitic stainless steel, complete with synthetic rubber O-ring. O-ring grade to suit the intended service. O-rings used on potable water systems shall be EPDM, UL classified in accordance with ANSI / NSF61 for potable water service.
   a) Manufacturers of Vic-Press 304™ Fittings: Victaulic Company of America

4. Solder Standard: Solder metal shall conform to the requirements of ASTM B32. Soldering fluxes shall conform to ASTM B813. Solder and fluxes used in drinking water systems shall have a maximum of 0.20-percent lead (Pb) content.

D. Indirect waste condensate piping from the flue gas process of the water heater(s) shall be as recommended by the water heater manuf. PVC or CPVC.

E. All LP gas piping inside the building shall be Schedule 40 black steel pipe with malleable pattern fittings, installed in strict compliance with the Massachusetts Fuel Gas Code, (248 CMR 5.00). All piping 2 in. and below shall be assembled with screwed malleable iron fittings; 2-1/2 in. and above

shall be welded. Provide necessary ball type gas shut-off valves or square head cocks and drips as required. All joints shall be made up with "Rectoseal" and tested.

1. All welding shall be done in accordance with the welding procedures of the National Certified Pipe Welding Bureau, or any other approved procedure, conforming to the requirements of the ASA Code for Pressure Piping. No welder shall be employed on the work who has not been fully qualified under the above specified procedure and so certified as a member of the local chapter of the National Certified Pipe Welding Bureau or similar locally recognized testing authority.

2. All LP gas piping, including gas shut-off valves and final connections to equipment, shall be the responsibility of the Plumbing Contractor.

4. All gas piping and final connections to gas-fired water heaters and gas trains regulators vent piping shall be the responsibility of the Plumbing Contractor.

   a. All main gas pressure regulators shall be independently vented to a safe outdoor location. Vent lines from regulators shall not be connected into a common line with the bleed line from gas operated diaphragm valves or from pressure relief valves. Vent lines shall be of steel or wrought iron pipe with means provided at termination points to prevent stoppage of the lines by foreign material, water or insects. Coordinate with HVAC Contractor and Domestic Hot Water Boiler manufacturer for gas train venting requirements. These are not shown on the drawings, but are required to be installed by the this contractor per code. Note that ventless gas regulators may be utilized on the gas trains.

   D. MegaPress Fittings: ½-inch through 2-inch shall conform to ASME B31.1, ASME B31.3, or ASME B31.9 MegaPress fittings with zinc and nickel coating for use with IPS carbon steel pipe conforming to ASTM A53, ASTM A106, ASTM A135, or ASTM A795. MegaPress fittings shall have an HNBR sealing element, 420 stainless steel grip ring, separator ring, and an un-pressed fitting leak identification feature. Sealing elements shall be verified for the intended use.

2.05 VALVES / SPECIALTIES

A. All valves in contact with potable water systems must be lead-free or meet the requirements of NSF61G. The model numbers given may not indicate this, but any submitted valve will be reviewed based on meeting the Lead Free law and NSF 61G.

B. Ball Valves:

1. On water lines inside the building, ball valves 4 in. and smaller shall be as manufactured by Aalberts Industries "Apollo" Valves model #77FLF-100 Brass Ball Valves, Lead Free Materials and Approvals, two-two-piece body, full port, blowout-proof stem, RPTFE seats and packings, heavy pattern forged design, silicone free assembly, corrosion resistant materials. For solder end valve, provide by Aalberts Industries "Apollo" Valves model #77FLF-100 Brass Ball Valves, Lead Free Materials and Approvals, two-two-piece body, full port, blowout-proof stem, RPTFE seats and packings, heavy pattern forged design, silicone free assembly, corrosion resistant materials.
   Provide 2-1/4 in. extended stems for piping 1/2 in. to 1 in. size; 1-1/4 in. extended stems for piping 1-1/4 in. to 2-1/2 in. size. 600 PSI CWP, positive l00 percent shutoff.
   Ball valves shall be full port style and all shall be lead free.

2. Drain valves at all low points shall be Aalberts Industries "Apollo" Valves model #70LF-100 HC or #70LF-200 HC series, 1/2 in. or 3/4 in. solder by 3/4 in. hose end with attached dust cover cap and chain.

3. Valves on gas lines shall be UL listed, 250 PSI LP gas rated, "Apollo" Model 80-100-YRPV Series with tee or lever handle, as approved by the National Fuel Gas Code. Where indicated on the Drawings, for Classroom zone shutoffs, ball valves shall be enclosed in a recessed valve box, as hereinafter specified.

4. Ball valves shall be of one (1) manufacturer, Conbraco Industries, Inc., "Apollo" Valves, Watts Regulator, Nibco/Scott, Jomar Valve or approved equal.

C. Balancing Valves:

1. Where indicated on the Drawings, furnish and install Victaulic Tour & Andersson Y-pattern multi-turn globe style valves. Bronze or Ametal copper alloy body, calibrated with differential pressure connection points. Digital handwheel with concealed memory stop to provide full valve closure and re-opening to set position.

2. Balancing valves shall be as manufactured by Tour & Andersson, Nibco, Armstrong, Jomar Valve or approved equal.

3. Alternate balancing valve: Furnish and install Flow Design Inc. ICSS Inline AutoFlow Controller for drinking water applications featuring:

    a. Flow limiting cartridge is machined stainless steel for greater control accuracy and dependability. Factory adjustable.
    b. All wetted parts are stainless steel meeting NSF/ANSI Standard 372 for minimal lead content.
    c. Compact inline design is less than half the height of typical controllers, allowing the ICSS to fit easily into tight installation.
    d. Tested and approved for “commercial hot water applications”.

4. Alternate balancing valve: Furnish and install Circuit Solver (¾” – 2”) as indicated on plans. Valve shall be Circuit Solver as manufactured by Therm-Omega-Tech, Inc or equivalent.

    1. Circuit Solver shall regulate the flow of recirculated domestic hot water based on water temperature entering valve, regardless of system operating pressure.
    2. When fully closed Circuit Solver shall bypass a minimum flow of hot water to maintain dynamic control of the recirculating loop.
    3. Circuit Solver valve is factory set for project conditions.
    4. Circuit Solver body shall be constructed of stainless steel. Internal components type 303 stainless steel; rated for 200 PSIG working pressure and 300˚F working temperature, NSF-61 Certified and the Thermal Actuator shall be spring loaded and self-cleaning.
        e. Circuit Solver to be installed by qualified tradesmen. Installed in each domestic hot water return piping branch beyond last hot water device in that (individual) branch. Provide suitable line size isolation valves, unions and strainer as indicated in piping detail shown on drawings. Provide suitable access panel as required in non-accessible ceiling and wall installations.
        f. Contact factory representative, Urell Incorporated at 617-923-9500 if additional information is required.

D. Check Valves:

1. Check valves shall be furnished and installed where indicated on the Drawings. Checks up to 3 in. shall be Class 125, solder ends, body and caps shall be ASTM B 62 cast bronze composition, swing type disc, Stockham Figure B-309.

2. Check valves 4 in. and larger shall be iron body, bronze mounted with body and cap conforming to ASTM A 126 Class B cast-iron, flanged, swing type disc, Stockham Figure G-931.

3. Check valves shall be as manufactured by Stockham, Jenkins, Milwaukee, or approved equal.

H. Plug Valves: Furnish and install cast-iron plug valves on all LP gas piping 2 in. and larger, with flanged ends, Model 133 as manufactured by Serek Audco, with 100 percent free area, rated at 125 PSI working pressure, or approved equal.

I. Strainers: Strainers shall be iron body 'Y' type with bronze strainers, 250 psig steam and 400 W.O.G. Provide ball valve with hose bib for blow down similar to Watts # B-6000-CC.

2.06 INSULATION

A. Provide 1-inch-thick fiberglass insulation on cold water piping and 1-inch-thick fiberglass insulation on hot water piping. All new piping shall be insulated and all existing piping disturbed within the boiler room or within a 10 foot radius of the new domestic hot water heaters shall be reinsulated. Insulation shall be suitable for the type of service and shall have an all-service jacket. Vapor barrier is required on cold water piping ASJ jacket required on all pipe pipe insulation. No insulation shall be applied until piping has passed tests as required by authorities having jurisdiction. Insulation, jackets and adhesives shall be flame retarding and shall have flame spread rating of no greater than 25 and a smoke developed rating of no greater than 50.

B. All fittings and valves shall be insulated with the proper factory pre-cut fiberglass insulation and covered using the factory, pre-molded, one-piece PVC fitting covers secured with flexible off-white 10 mil polyvinyl chloride film bonded with a specially formulated adhesive that can be installed indoors and out with a strong permanent bond conforming to MIL Spec. No. 7798-A.

C. Insulation shall be Johns Manville, Owens-Corning, CertainTeed Corp., Knauf, Armstrong, or approved equal.

D. Pipe hangers shall be outside insulation and shall be provided with 12" long; minimum 24 gauge galvanized steel insulation protection shields. Insulation on piping which passes through walls pr partitions shall pass continuously through sleeves, except at fire walls, smoke partitions and floor penetrations where space between sleeves and piping shall be fire stopped with approved packing.

2.07 HANGERS

A. Hangers shall support piping from building structure to maintain required grade and pitch of pipe lines, prevent vibration, secure piping in place and provide for expansion and contraction. Hangers shall be adjustable clevis type; trapeze hangers may be used where conditions permit.

B. Hanger spacing shall conform to requirements of state and local plumbing codes; in no case shall horizontal piping be supported at intervals greater that 6 ft.

C. Hanger rods shall be connected to beam clamp as required to attach to the building construction. No ram-set or shot shields will be allowed.

F. All piping and equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

2.08 HOT WATER TEMPERING VALVE -ALTERNATE #1

A. Plumbing Contractor to provide Digital Mixing Valve as shown on schedule. Basis of Design

model shall be Powers Intellistation JR as manufactured by POWERS (a Watts Company). Contact local rep. Patrick Shea at Emerson Swan for assistance. Digital Mixing Valve shall have the following:

a. Lead free* digital water temperature control and monitoring system shall feature 3.5" full-color touchscreen interface which is configurable on location and does not require factory pre-programming.
b. System shall have the “Watts Onsite App” available on mobile device with ability to:
    1. Provide remote monitoring and control.
    2. Send notifications via Text, Email, or Push alerts.
c. System shall control water temperature to +/- 2°F in accordance with ASSE 1017 and resist "temperature creep" during periods of low/zero demand.
d. System shall use a 316L Stainless steel 3-way ball valve design
e. Controller shall be password protected and feature a user-adjustable outlet temperature range of 60 - 180°F with high and low temperature alerts, and an approach temperature of 2°F.
f. System shall digitally control and monitor mixed outlet temperature.
g. Controller shall integrate with building automation systems (separate module not required) through BACnet and Modbus protocols and feature local and remote temperature alarms.
h. System will feature a user-set, high-temperature sanitization mode for thermal disinfection of bacteria and a programmable temperature set back feature to improve energy efficiency.
i. System will also feature high speed actuator with override feature. In the event of a power failure, system will open full cold supply. In case of a loss of cold water, the system will close hot water supply.
j. System shall be listed/approved to ASSE 1017, cUPC, NSF, CSA 24/UL873 and BTL (BACnet Testing Laboratories)
k. Basis of Design is Powers Model LFIS100VL

B. Final commissioning will be the responsibility of the Plumbing Contractor. Detailed startup and commissioning report must be provided to engineer of record as well as end user. Reporting documents will be provided by Manufacturers Rep Emerson Swan as well as assistance on site for final startup and commissioning.

C. Alternate manufacturers are Leonard Valve Company, Armstrong Rada, or approved equal.

2.09 THERMOMETERS

A. Straight Thermometers:

1. Where indicated on the Drawings, furnish and install 7 in. long die-cast aluminum case, "Adjustable Angle" red appearing mercury tubing thermometers, H.O. Trerice Co., Cat. A001 complete with separable stainless steel Type 304 socket, 30 degrees to 240 degrees F. range, and lagging extensions when installed in insulated pipe.

2. Thermometers to be adjusted to a position for maximum readability from normal operator's position.

3. Thermometers shall be H.O. Trerice Co., Weksler Instruments Corp., Weiss Instruments, or approved equal.

2.10 PIPE IDENTIFICATION, VALVE TAGS AND SIGNAGE

A. All new piping, except that piping which is within inaccessible chases, shall be identified with semi-rigid plastic identification markers equal to Seton or approved equal Setmark pipe markers or Marking

Services Inc. Direction of flow arrows are to be included on each marker. Each marker background shall be appropriately color coded with clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ASME 13.1-2007). Setmark snap-around markers shall be used above six inch overall diameters up to six inches and strap-around markers shall be used above six inch overall diameters. Markers shall be located adjacent to each valve, at each branch, at each cap for future, at each riser take off, at each passage through wall, at each pipe passage through floors, at each pipe passage to underground and on vertical and horizontal piping at 20-foot intervals maximum. All non-portable water lines and outlets shall be identified in accordance with the requirements of the Massachusetts Uniform State Plumbing Code.

B. All new gas piping shall be painted with 1-coat of rust inhibiting primer and final coated with ANSI yellow and properly labeled "LP Gas".

2.11 MOTORS, STARTERS, WIRING & CONTROLS

A. Provide motors and controls, and furnish starters, for plumbing equipment. Provide all control and other related wiring, including interlocks. Power wiring to panelboards, disconnect switches, starters and motors shall be provided by the electrical subcontractor hired by the plumbing contractor. The electric work for this project shall be done on a design-build basis in accordance with NEC and all applicable federal, state and local codes.

B. The plumbing contractor shall hire the Owner's proprietary EMS control vendor to perform all control related work as indicated herein. The Owners EMS control vendor is Honeywell Building Solutions, rep. contact Mr. Dan Kervin cell #781-856-9004.

C. The EMS control vendor shall modify the existing combustion air damper to only open if the room temperature requires cooling. EMS vendor must provide a space sensor (unless existing space sensor for heating can be used to support such) and associated wiring and controls and modify logic of damper as needed to accomplish this change in sequence.

D. The plumbing contractor shall hire the Owner's control vendor and/or project electrician to ensure the existing boiler shutdown switch(es) disable all the boilers and water heaters in the room if switched to the off position.

E. CARBON MONOXIDE DETECTION SYSTEM

1. Provide a Carbon Monoxide & Nitrous Oxide Detection within the Auto Diesel shop area for control of ventilation (via EMS communication) and to provide an alarm signal when a hazardous level of CO or NOx is detected.

2. The Carbon Monoxide / Nitrous Oxide Detection System shall consist of one (1) central control/annunciator panels with integral horn & strobe light.

3. ACCEPTABLE MANUFACTERS

a. Manufactures shall have local representation experienced with Carbon Monoxide Detection Systems and minimum of ten (10) continuous years of active service. A local supply of spare parts and authorized factory repair service shall be available.

b. List of Manufactures:
   a. Toxalert, Inc.
   b. Vulcain.
   c. Honeywell.
   d. Approved equal.

c. Specification has been based around Toxalert. Local representative is Air Distribution Corporation. Contact: Mark Persechini Telephone number: 508-588-9595

4. CARBON MONOXIDE SENSORS (CO)

a. The CO sensors shall output a linear 4 to 20 ma analog signal proportional to the CO gas levels detected to the controller and shall have a normal operation range of –20 deg. F. to 122 deg. F. and 0 to 95%R.H. non-condensing. The sensor shall have a range of 0 to 250 PPM for CO, with an accuracy of +/- 3% of range. The sensors shall be microprocessor based with twelve (12) bits analog/digital resolution and periodically recalibrate itself.

b. The CO sensors shall have a solid-state sensing element for life of ten (10) years and shall be microprocessor based and be self-monitoring of proper operation. The temperature thermistor will automatically compensate the output signal for changes in ambient relative humidity and temperature.

c. The CO sensors shall have indicators for: 1) power on; 2) automatic calibration/operating properly; 3) sensor malfunction; 4) high CO alarm.

d. The sensor enclosure shall be a NEMA 1 removable hinged cover cabinet, with a keyed lock to prevent tampering. An aluminum splash/dust shield on the face of sensor to protect sensing element.

e. The sensor shall be powered by 24 VAC, 4 wire, 18 gauge shielded.

f. Sensors shall be located as indicated on the drawing(s).

g. Carbon monoxide sensor shall be a model TOX-CO/ANA as manufactured by Toxalert, Inc.

5. CONTROLLER/ANNUNCIATOR

a. Provide a controller to monitor carbon monoxide sensors. The controller shall contain power supplies, solid-state control logic, amplifiers, and output to start and stop the ventilation fans. The controller shall be designed to be wall mounted for visual and audible alarm indication.

b. The controller shall be microprocessor based and utilize battery back-up to ensure system programs are not lost during power interruption.

c. The controller shall be capable of fan start/stop damper open/close operation from a high space temperature.

d. Fan (if applicable) ON delays can be programmed from one (1) to ninety-nine (99) seconds. Power input to control panel should be 120V/1PH/60HZ.

e. The controller and sensors shall be mounted as shown on drawings.

f. Provide labeled indictors on the face of the controller panel for 1) power ON, 2) high CO level, 3) fan ON (if applicsable) and 5) power to each sensor.

g. Provide an audible alarm for each sensor with a sound level minimum of 85 db. Also, provide a momentary pushbutton to silence the audible alarm. The visual alarm indicator shall remain lighted as long as the alarm condition persists even though the audible signal has been silenced.

h. The controller shall have all the necessary power supplies and transformers to supply power to CO and NOx sensors.

i. System controller shall be a Toxalert, Inc. Model TOC-CO Series controller.

6. CONDUIT AND WIRE

a. Conduit and wiring shall be as indicated on the plan(s) and meet all local and national codes. Signal wiring shall be a minimum size of #18 AWG for sensors.

b. All wiring shall run in EMT conduit. Provide weatherproof conduit in exterior locations and in the wash bay.

7. INSTALLATION

a. This contractor shall provide all conduit, wiring, and junction and outlet boxes as required for a complete system.

b. Electrical contractor shall provide 120 VAC power to the CO detection system.

8. TESTS AND ADJUSTMENTS

a. A representative of the manufacturer shall be present with the contractor to check out and start up the system per manufacturer recommendations.

b. Perform an actual CO system test using CO gas cylinders. The test will be witnessed by the engineer and other interested parties.

F. Sequence of Operation:

- If the boiler room safety shutdown switch(es) is placed in the off position, the existing heating boilers and the new water heaters shall all be disabled. Devices shall automatically re-enable once the switch is placed in the on position.
- If the boiler room CO alarm activates, a local alarm shall report and an alarm shall go to the building fire alarm system set for either Trouble or Alarm as directed by the fire department. Initial alarm setpoint shall be 20 ppm (adj.).
- The GWH-1, GWH-2 & GWH-3 water heaters shall operate on their own integral controls to maintain a tank temperature of 140°F.
- The (E) RP pumps shall operate based on the setpoint of the return water temperature sensor. Setpoint shall be adjustable and is based on maintain the return loop temperature within a range of the set mixing water temperature. Note: The new electronic mixing valve may require continuous operation of the low temp. loop recirculation pump to ensure optimal operation.
- The existing combustion air damper logic shall remain as is however as the dampers are no longer required for domestic hot water combustion air the programming shall be modified to remove the command to open the dampers if the domestic hot water heaters requiring it. Commands from heating boilers, refrigerant purge and room ventilation as applicable shall remain.

PART 3 - EXECUTION

3.01 SPECIAL RESPONSIBILITIES

A. Cooperate and coordinate with other trades in executing work of this Section. Perform work such that progress of entire project including work of other trades shall not be interfered with or delayed. Provide information on items furnished under this Section to be installed by other Sections.

1. Obtain detailed information from manufacturers of equipment as to proper method of installation. Give full information so that openings required for work of this Section might be coordinated with other work and other openings and many be provided for in advance. In case of failure to provide information, cutting and patching will be done at the expense of this Section to the satisfaction of the Engineer/ Architect.

2. Notify Architect of location and extent of existing piping and equipment not shown on the Drawings which interferes with new construction. With approval of Architect, relocate existing equipment to permit new work to be installed as required by Contract Documents. With approval of Engineer/Architect, remove non-functioning or abandoned piping and equipment.

B. During progress of work, remove and properly dispose of resultant dirt and debris and keep premises reasonably clean. Upon completion of work, remove equipment and unused material provided for work.

C. Conduct work so as not to interfere with functioning of existing sewer, water and gas mains. Extreme care shall be observed to prevent debris from entering piping. Confer with Engineer/Architect as to disruption of water service or their utilities due to testing or connection of new work to existing.

D. All piping and equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

3.02 MATERIALS AND WORKMANSHIP

A. Work shall be executed in a workmanlike manner and shall present neat appearance when completed. Piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Material and equipment shall be installed according to manufacturer's recommended best practice.

B. Materials and equipment shall be new, unless otherwise noted.

3.03 ESCUTCHEONS

A. Escutcheons shall be installed around exposed pipe passing through finished floor, wall or ceiling. Escutcheons shall be heavy cast brass, chrome-plated, adjustable, of sufficient outside diameter to cover sleeve opening and to fit snugly around pipe or insulation.

3.04 SLEEVES AND INSERTS

A. Sleeves for piping between floors and through firewalls or smoke partitions shall be installed with approved packing between sleeves and piping to provide firestop. Coordinate with G.C. requirements.

B. This contractor is responsible for sleeving all pipe penetrations before pouring of slab. If additional holes are required this contractor shall core drill such holes in coordination with the general contractor and with prior consent of the Engineer/ Architect.

3.05 INTERIOR WATER SUPPLY SYSTEM

A. Water supply piping shall be run as indicated on the Drawings, including new connections to mains and supplies to fixtures. Provide drain valves where necessary.

3.06 VALVES

A. All valves shall be furnished and installed under this Section shall be located in a manner to allow proper access for service and repair.

B. In no case shall valve stem and handle on a gate or globe valve be installed below the center line of the pipe it serves.

3.07 JOINTS AND CONNECTIONS

A. Joints and connections of piping shall be made permanently gas and watertight.

B. Dielectric couplings or unions shall be used where dissimilar piping materials are joined.

C. Final plumbing and gas connections to all equipment furnished or installed by others shall be by this Section.

3.08 INSTALLATION OF EQUIPMENT

A. Install equipment to avoid interference with structure and work of other Sections, preserve adequate headroom and clear doors and passageways, to satisfaction of Architect, and in accordance with Code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.

B. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the equipment being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation.

C. All equipment running within trusses must be supported from top chord of truss at panel point. For any alternate configurations or for heavy pieces of equipment coordinate fully with structural engineer for support location before installation.

3.09 DISINFECTION

A. The new domestic hot water distribution piping system components shall be thoroughly disinfected with solution containing not less than 50 parts per million of available chlorine unless other sanitation procedures are required by the water heater manufacturer. Solution shall be introduced into system for period of eight hours, during which time valves and faucets shall be opened and closed several times. After disinfection, solution shall be flushed from system with clean water until residual chlorine content is not greater than 0.2 parts per million.

B. Any extended shutdown of the hot water system shall require the system be flushed with 140F water for at least 12 hours. During this time maintain recirculation pumps operational and ensure no building occupants use the fixture until sanitation is complete and system is set for normal operation

3.10 CLEANING

A. Upon completion of work but prior to final system testing, all parts of installation shall be thoroughly cleaned. Fixtures, pipe, valves and fittings shall be completely cleaned of grease, metal cuttings, dirt, etc. Protective covers shall be removed and fixtures shall be cleaned and ready for use.

3.11 TESTING

A. Provide testing of plumbing systems as required by authorities having jurisdiction, including Owner and Engineer/Architect. Tests shall be conducted as part of work of this Section and shall include labor, equipment, apparatus and services required to perform tests.

B. Prior to final acceptance, furnish Engineer/Architect with certificates of testing and inspection for plumbing systems indicating approval of authorities having jurisdiction and conformance with requirements of Contract Documents.

C. Notify Architect and authorities involved at lest 48 hours prior to testing and inspection. Do not paint, cover or conceal work prior to testing, inspecting and obtaining approval.

D. Provide temporary piping and connections for testing, flushing or draining systems to be tested. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to like-new condition. Piping must be absolutely tight before it will be accepted and joints shall be made tight without caulking.

E. Water piping shall be tested tight for 24 hours under hydrostatic pressure 1-1/2 times system working pressure. Tests shall be witnessed by Architect and approved before water is drained off. Repair leaks and retest as required.

3.12 LABELING

A. Refer to 2.10 PIPE IDENTIFICATION, VALVE TAGS AND SIGNAGE for additional information.

B. Provide pipe markers of pressure sensitive tape or laminated plastic, color coded and indicating the type and direction of flow of the plumbing service. All exposed new CW, HW and gas piping exposed in the mechanical room within 10 feet of the water heaters and mixing valve shall be labeled. Hot water of varying temperatures shall be labeled as such.

C. All new gas piping and vent piping shall be painted with 1-coat of rust inhibiting primer and final coated with ANSI yellow and properly labeled “LP Gas”.

END OF SECTION 22.00.00

SECTION 23.00.00

HVAC

PART I - GENERAL

1.01 RELATED DOCUMENTS & GENERAL

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section. Where paragraphs of this Section conflict, the more stringent requirements shall govern.

B. Division 23.00.00 contractor shall be considered the "prime contractor" for this project. This contractor shall be responsible for providing all labor and materials necessary to provide a fully functional and complete system including related work such as plumbing, wall repair, concrete pads, coring, cutting & patching, finish work, etc... Contractor shall hire properly licensed and qualified subcontractors to perform work outside their scope of their expertise such as but not limited licensed electricians for ATC related electrical work, licensed plumbers (gas fitters allowed for gas and flue venting) for plumbing work, natural gas piping and flue venting. Division 22.00.00 Plumbing and Division 26.00.00 Electrical are filed sub-bids for this project of which the HVAC owns management of such as the prime.

C. All work shall comply with all federal, state and local codes and any other authorities having jurisdiction.

1.02 SUMMARY

A. Provide all materials, labor and equipment required to perform the work of this section, as shown on the Contract Drawings and as specified herein, to include:

1. Disconnect and remove two (2) existing oil-fired burners, oil fired water heater, fuel oil transfer pumps, flue venting, fuel oil piping and associated piping, controls, etc… made abandoned by this project and as shown on the demolition drawings.
2. LP Gas-fired burners.
3. Boiler, burners and safety interlocks.
4. Flue venting (by licensed plumber or gas-fitter).
5. Piping and all related hydronic accessories.
6. Acid neutralizing tank and associated piping.
7. Heating piping of Indirect water heater (Indirect water heater and associated domestic water piping shall be by filed sub-bid licensed plumber, see 22.00.00)
8. Flue Venting (by Licensed Plumber or gas fitter)
9. Combustion air systems.
10. Insulation, thermal and/or acoustic, for ductwork and piping.
11. Automatic temperature controls.
12. Electrical power wiring (shall be by filed sub-bid licensed electrician, see 26.00.00)
13. Instruction manuals and startup instructions.
14. Testing and balancing.
15. Equipment bases and supports.
16. Miscellaneous steel, dunnage, supports, hangers, pads, etc., as shown, and as required
17. Provide all coring, cutting and patching of the work required of this section
18. All rigging and hoisting of equipment as required.

B. Related Work Specified Under Other Divisions

1. Division 22.00.00 – Plumbing (Filed Sub-Bid)
2. Division 26.00.00 - Electrical (Filed Sub-Bid)

C. This contractor is responsible for coring and sleeving all holes required of his work.

D. All penetrations of the fire rated structure (walls, ceiling, floors, etc..) shall be firestopped. All penetrations of the structure whether fire rated or not shall be sealed to minimize sound transmission between spaces.

E. The work of this section is shown on drawings DM-1, M-1 and M-2. Division 22.00.00 Plumbing and 26.00.00 Electrical are filed sub-bid for this project of which the HVAC owns management of such as the prime contractor.

F. Provide seismic bracing as required by the Commonwealth of Massachusetts building code 780 CMR, 9th edition. Contractor shall hire a seismic consultant to comply with requirements of the code. All equipment and ductwork shall be seismically supported and all piping over 2" unless specifically exempt by 780 CMR Chapter 16. Contractor to note that in addition to other equipment, new boiler shall be seismically restrained to the concrete pad regardless of code exception.

G. The school must have domestic hot water available during normal occupied school days. If the contractor intends to perform any shutdown work during normal school hours, a temporary domestic hot water supply must be provided. The contractor shall perform the shutdown and changeover work of the domestic hot water system during the schools summer shutdown between **June 20 and August 20, 2023**. If work shall occur after August 20th, plumbing contractor must furnish and install a temporary electric hot water heater as shown on the plans and specified herein. The heating boilers must be operational no later than **October 15, 2023.**

H. All contractors working on site must be CORI & SORI checked.

1.03 SUBMITTALS

A. Product data: within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Coordinated shop drawings, showing proposed layout of equipment, piping, ducts, registers, grilles, controls, control drawings and other components of the system. Ductwork shop drawings shall be done at 1/4"=1'-0".

2. Manufacturers catalog cuts, Samples and other items needed to fully demonstrate the quality of the proposed materials and equipment. In addition to the submittals formerly mention herein submit equipment specification sheets and dimensional data on all equipment including but not limited to the following:
   - Gas Fired Boilers
   - Hydronic Piping, Valves & Accessories
   - Hydronic Pumps
   - Automatic Temperature Controls
   - Ductwork.
   - Flue Piping, Combustion air ductwork and accessories

B. Record Drawings

1. Include a copy of the Record Drawings in each copy of the operation and maintenance manual described below.

2. Contractor shall provide complete set of as-built drawings in each O&M manual including a USB flash drive containing drawings in both ACAD and PDF format.

C. Testing and Balancing Reports:

1. Submit an electronic copy of a certified testing and balancing report to the Architect for review and approval. Include all air flow and temperature readings as outlined herein.

D. Operating Instructions:

1. Prior to the completion of all work and the final inspection of the installation by the owner, three (3) copies of a complete Instruction Manual, bound in booklet form and suitably indexed, shall be submitted to the Architect for review and approval. All written material contained in the manual shall be typewritten or printed. In each copy of the manual provide a USB flash drive with the entire manual in PDF format.

1.04 INSTRUCTION OF OWNER'S PERSONNEL

A. After completion of all work and all tests and at such time as designated by the owner, provide the necessary skilled personnel to operate the entire installation for a period of eight (8) hours. Instructional periods shall be scheduled with the Owner but must be broken down to include multiple 4 hour training sessions at the discretion of the Owner.

B. During the operating period, fully instruct the owner's representative in the complete operation, adjustment and maintenance of the entire installation.

C. It shall be the HVAC subcontractors responsibility to coordinate the training, factory start-ups and instruction outlined in division 23.00.00 and the Testing and Balancing requirements. Factory start-up by authorized representatives are required for all equipment.

1.05 PERMITS, FEES, RULES AND REGULATIONS

A. Refer to Bidding and Contracting Requirements, including Document - GENERAL CONDITIONS and Documents - SUPPLEMENTARY CONDITIONS, for requirements all of which shall be included as part of this Specification.

B. Give the proper Authorities all requisite notices or information relating to the work under this Section. Obtain and pay for all fees, licenses, permits and certificates. Comply with the rules and regulations of all Local, State and Federal Authorities having jurisdiction, the Codes, Standards, recommended practices and manuals of the National Fire Protection Association, I.S.O., and the Public Utilities Companies serving the building.

1.06 MECHANICAL AND ELECTRICAL COORDINATION DRAWINGS

A. The prime HVAC contractor shall be responsible for generating base coordination drawings for the project coordinating with all other trades. Hard copies of the coordination drawings are required for this project.

1.07 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Contractor's superintendent shall conduct all coordination between the Contractor, the Architect, the Engineers, etc., and shall fully represent the Contractor's position in his absence. All decisions by the superintendent shall become the responsibility of the Contractor and binding to the Contract. The Contractor shall be responsible for the drawings, and that which is written or implied in the specifications.

C. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

D. Before submitting the final proposal examine the site of the proposed work to determine existing conditions that may effect the work, as this section will be help responsible for any assumption in regard thereto.

E. All equipment, ductwork, piping and materials utilized for this project must be protected from exposure to weather until installed. Interior equipment and materials shall not be installed unless the area in which they are being installed is adequately weather tight.

F. HVAC Subcontractor must comply with requirements of Section – Construction Indoor Air Quality (IAQ) Management as well as the SMACNA IAQ Guidelines defined in paragraph 3.02 of this section.

G. Condensate evaporation trays are expressly forbidden on all HVAC equipment.

H. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied be a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.08 GUARANTEE

A. The Contractor shall guarantee every component part of each system for a minimum of one year, parts and labor included. The contractor shall also provide the Owner with factory warranties for all equipment inclusive of a 10-year warranty on the boiler heat exchangers. Provide factory start-up on boilers.

PART 2 - PRODUCTS

2.01 DUCTWORK

A. For the Heating, Ventilating and Air conditioning systems, provide galvanized sheet metal ducts fabricated and installed to pertinent ASHRAE and SMACNA standards, except as otherwise indicated. Duct systems shall comply with the pressure velocity classification in compliance with the SMACNA HVAC Duct Construction Standards, current edition. Minimum pressure classification shall be 2"w.g. Ductwork serving louver plenums and blank off panels shall be min. 20-gauge aluminum.

B. For combustion air provide a new louvered penthouse style intake with removable washable aluminum screen.

C. Furnish and install the size, connections and run of ducts as indicated on the drawings. Drawings indicate inside clear dimensions.

D. The sheet metal ductwork shall, whether indicated or not, rise and drop and change in shape to clear lighting fixtures, plumbing and structural framing etc., to maintain the desired clearances within the spaces.

E. The ductwork shall be continuous, with airtight joints and seams presenting a smooth surface on the inside and neatly finished on the outside. Ducts shall be constructed with curves and bends so as to effect an easy flow of air. Unless otherwise shown on the Drawings, the inside radius of all curves and bends shall be not less than width of ducts in plane of bend.

F. All rectangular ductwork, unless otherwise noted, shall be built from galvanized sheet steel and thoroughly braced and stiffened. All ductwork shall be of the gauge recommended by SMACNA except that the minimum gauge thickness for any duct shall be no less than 24.

G. Duct joint sealing, reinforcing, flanges, etc. for square sheet metal ducts shall be based on maintaining airtight ducts at 3 in. w.g maximum static pressure with maximum of 5 percent leakage of total fan capacity, 1/2 of one percent for round and oval ducts. All joints in round and rectangular ductwork shall be sealed with UL classified NFPA approved duct sealer. Off gasing of sealer must comply with LEED requirements. Seal all ductwork at joists and seams with water based duct sealer DuctMate® EZ-Seal or approved equal.

H. Provide seismic bracing as required by the Commonwealth of Massachusetts building code 780 CMR, 9th edition. Contractor shall hire a seismic consultant to comply with requirements of the code. All equipment and ductwork shall be seismically supported and all piping over 2" unless specifically exempt by the code.

2.02 PIPE & FITTINGS

A. All pipes shall be new, free from scale or rust, of the material and weight specified under the various services. Each length of pipe shall be properly marked at the mill or proper identification with name or symbol of manufacturer.

B. All steel piping, except where otherwise rated, shall be standard or extra strong weight, in conformance with ASTM A-53 Grade A seamless, as manufactured by National Tube Division, Republic Steel Corp., or approved equal.

C. All copper tubing shall be of weight as required for service specified, with conformance with ASTM B-88 for types "L" and "K" tubing, as manufactured by Chase, Anaconda, revere or approved equal. Tubing and fittings shall be thoroughly cleaned with sand cloth and treated with an approved non-corrosive flux before solder is applied.

D. Generally, unless otherwise specified, joints in steel piping 2-1/2" and under shall be screwed, and all sizes 3" and over shall be welded, flanged or mechanical connected using approved connectors as manufactured by Victaulic or approved equal. F-I-T type fittings shall <u>not</u> be allowed.

E. Screwed Piping
   1. All connections to apparatus with screwed piping shall be made with 250 pound brass or bronze seat unions.
   2. All screwed nipples shall be scheduled 80 nipples.

F. Grooved mechanical joint pipe, fittings and couplings shall be allowed as an acceptable substitution for welded, threaded or flanged pipe fittings except as otherwise not allowed by applicable codes. Product shall be as manufactured by Victaulic Company of America, Grinnell Mechanical Products, Anvil International Gruvlok or an Engineer approved equal. Fittings shall comply with ASTM A536 with grooves or shoulders to accept grooved end couplings. Mechanical couplings shall consist of ductile

iron housing, synthetic rubber gasket of a central cavity pressure-responsive design, nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

1. Rigid type: Housings (12" and smaller) shall be cast with offsetting, angle-pattern bolt pads or tongue and groove design to provide system rigidity and support and hanging in accordance with ASME B31.1 and B31.9..Only designs that require metal-to-metal pad contact permitted. Designs that permit spaces or gaps at bolt pads or require a torque as a primary means of ensuring joint rigidity per written manfuacturer's instructions are not permitted. Victaulic Style 107H, Style 07 or W07 or Gruvlok Style 7401, Style 7402, Style 7400.
2. Flexible Type: Use in locations where vibration attenuation and stress relief are required. Victaulic Style 177, 77 and W77 or Anvil International Gruvlok Style 7001.. Three (3) flexible couplings may be used in lieu of each flexible connector at major equipment in accordance with published guidelines.
3. 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, W741 or 743 or Anvil International Gruvlok Style 7012, 7013 or 7788.

G. Copper Hydronic Pipe Mechanical Fittings by Viega ProPress or approved equal by Elkhart or Nibco: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and the performance requirements of IAPMO PS117, and ICC LC1002. ProPress fittings ½-inch thru 4-inch for use with ASTM B88 copper tube type K or L and ½-inch up to include 1-1/4-inch annealed copper tube. ProPress fittings shall have an EPDM sealing element and Smart Connect (SC) feature. 2-1/2-inch thru 4-inch shall have a 420 stainless steel grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) feature. Sealing elements shall be verified for the intended use

ProPress bronze, or copper fittings: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the pipe end with a clean rag. Visually examine the fitting sealing element to insure there is no damage, and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Always examine the tube to insure it is fully inserted into the fitting prior to pressing the joint. ProPress fittings ½-inch thru 4-inch shall be joined using Ridgid ProPress Tools. 2-1/2-inch thru 4-inch ProPress copper fittings shall utilize Ridgid ProPress XLC Rings, and 2-1/2-inch thru 4-inch bronze ProPress fittings shall utilize Ridgid ProPress XL Rings. ProPress fittings shall be installed according to the most current edition of the Viega installation guidelines. Sealing elements shall be verified for the intended use. Installers shall attend a Viega ProPress installation training class.

After ProPress fittings have been installed a "step test" shall be followed. Utilizing air, water, or dry nitrogen, pressurize the system not to exceed 85 psi. Walk the system and check for leaks. If you do not locate any leaks proceed to pressurize the system to the recommended pressures, not to exceed 600 psi. Should you locate a leaking joint that has not been pressed, relieve the pressure from the system, ensure the tube is fully inserted into the fitting and press the fitting. Resume test procedure, after the necessary repairs have been made. This test shall be in addition to the required hydrostatic tests specified elsewhere within the specification.

H. Steel Hydronic Pipe Mechanical Fittings by Viega MegaPress or approved equal via welded, threaded or grooved piping system method: ½-inch through 2-inch shall conform to ASME B31.1, ASME B31.3, or ASME B31.9 MegaPress fittings with zinc and nickel coating for use with IPS carbon steel pipe conforming to ASTM A53, ASTM A106, ASTM A135, or ASTM A795. MegaPress fittings shall have an EPDM sealing element, 420 stainless steel grip ring, separator ring, and an un-pressed fitting leak identification feature. Sealing elements shall be verified for the intended use. Installation must be in accordance to manufacturer's instructions and specifications

Mega Press Systems: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed chamfered and all paint, laqaur, grease, oil or dirt shall be removed from the pipe end with an abrasive cloth or Viega pipe end prep tool. Visually examine the fitting sealing element to insure there is no damage, and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Always examine the pipe to insure it is fully inserted into the fitting prior to pressing the joint. MegaPress fittings hall be joined using Ridgid MegaPress Tools. MegaPress fittings shall be installed according to the most current edition of the Viega installation guidelines. Sealing elements shall be verified for the intended use. Installers shall attend a Viega MegaPress installation training class."

2.03 STEEL PIPE: HEATING SUPPLY AND RETURN (HWS&R)

A. Pipe: Black, Schedule 40 conforming to ANSI B125.2 or B125.1. Pipe to be used for welding shall be furnished with beveled ends.

B. Fittings:

1. 2 in. and smaller, screwed, 125 lb. cast iron conforming to ANSI B16.4.

2. 2-1/2 in. and larger, screwed, 150 lb. malleable iron conforming to ANSI B16.3 or grooved.

3. For welded pipe, all sizes, standard weight black steel welding pattern conforming to ANSI B16.5, B16.9, and B16.25.

C. Joints: Screwed joints shall be made up with Teflon pipe thread tape, Teflon liquid, or other approved non-hardening joint compound applied to male thread only. Welded joints shall be made by oxyacetylene or electric arc process and comply with latest ASA "Code for Pressure Piping" requirements.

D. Any pipe 1-1/4 in. and larger may be welded or use grooved joints, no pipe larger than 3 in. shall be screwed.

E. Coil connections are to be made so the coil can be removed without cutting pipe.

2.04 HEATING WATER SUPPLY AND RETURN and CONDENSATE (HWS&R & C)

A. Copper Tube Pipe: Type L, hard drawn, conforming to ANSI H23.1.

B. Fittings: Wrought copper solder pattern conforming to ANSI B16.22.

C. Joints: Made with 95-5 tin-antimony solder using non-corrosive flux. The HVAC Subcontractor, at his option, may use the Victaulic CTS grooved copper system for 2" and larger or the Anvil International Gruvlok CTS grooved copper system for 2" and larger.

D. The HVAC Subcontractor has the option to use copper pipe on heating supply and return and heating water supply and return for 2.5" diameter piping or less.

E. Use of CPVC or PVC schedule 40 piping for boiler flue vent condensate shall be allowed if approved product by boiler manufacturer.

2.05 PIPE FOR VARIOUS SERVICES:

A. Solder for each solder-type fitting shall be of 95% tin and 5% antimony.

B. Pipe Schedule:

Service	Piping Type	Piping Sch. WT.	Notes
Hot Water Piping	Copper Steel	Type 'L' Sch. 40	
Cond. Drain Line	CPVC or PVC	Sch 40	
Water Feed Line	Copper	Type 'L'	
Natural gas piping Steel		Sch 40	See article 2.05

2.06 VALVES

A. All valves shall be of a design which the manufacturer lists for service and shall be of the materials allowed by the latest edition of the ASME Code for pressure piping for the pressure and temperature contemplated, unless higher grade or quality is specified herein. All valves shall be of the same manufacturer except for special applications. Valves shall be as manufactured by Apollo, Watts or Jenkins.

B. The system shall be supplied with valves in all branch mains and risers, at all pumps, tanks, reducing and control valves, heating and cooling surfaces and at all apparatus; so located, arranged and operated as to give complete shut-off. Except where flanged valves are used, each connection to equipment shall be made with screwed or flanged unions on the equipment side of the valves.

C. All valves 2" in diameter and smaller shall be bronze with bronze bodies. Valves 2-1/2" in diameter and over shall have iron bodies with bronze trim (except where otherwise noted).

D. Ball valves shall be full port bronze body, bronze or stainless steel ball and stem, Teflon seats and seals, threaded ends, 400 psig cold W.O.G. by Apollo, Watts or Jenkins.

E. All bronze and iron valves shall be furnished with Teflon impregnated packing.

F. Provide valves of the type as shown on the drawings as specified herein and as scheduled:

Service	Valve Type	Rating	Remarks
Water	Ball	400 W.O.G.	2-1/2" and less
Water	Butterfly w/ mem	200 W.O.G.	3" and larger**
Drain Valves	Ball	200 W.O.G.	Hose end & cap

**All butterfly valves must have memory stop positions.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide necessary structural members, hangers, and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers in contact with copper or brass pipe shall be copper plated steel.

B. Pipe hangers shall be the clevis type, except where otherwise noted.

C. Spacing of pipe hangers shall not exceed eight (8) feet. Additional hangers shall be provided at each pump, control valve, expansion tank, air separator, heat exchanger and all other accessories as required to adequately support the piping system.

D. 12 gauge galvanized steel, minimum 12" long insulation shields shall be provided at all hangers supporting insulated piping. High density pipe insulation shall be provided at pipe hangers to prevent crushing of insulation or damage to vapor barrier.

2.08 SPECIALTIES

A. Swing Check – Bronze body, 125 W.S.P., 200 W.O.G.

B. Strainers – Strainers shall be iron body 'Y' type with stainless steel strainers, 250 psig steam and 400 W.O.G. Provide ball valve with hose bib for blow down similar to Watts # B-6000-CC.

C. Dielectric unions – Provide where joining to dissimilar metals, Watts series #3000 or approved equal.

D. Air Vents – Provide automatic air vents at all high points within the system and at all coils. Air vents shall be Sparco model #FV 147A. Drain shall not be concealed so as to observe any failures of air vents. Minimum vent line size is 3/8".

E. Balancing Valves – Provide calibrated balancing valves at each boiler and where shown on the drawings and as specified herein, Taco model #ACUF circuit setters. Contractor shall furnish to the Owner a Differential Gauge meter Taco model #789 with durable carrying case and hose connections.

F. See also 2.05 for natural gas products and 2.14 for boiler automatic valves.

2.09 UNIONS

A. Unions shall be of the same class and material as the pipe and fittings of the system in which they are installed. In black steel piping systems, they shall be 200 lbs. black malleable iron with brass ground joint equal to Dart Figures 0832, 0834, 0835, 0836, or 0838. In copper and brass piping, they shall be 125 lb. bronze or brass with ground joint.

B. Flanged unions for welded pipe shall be weld neck, 150 lb. raised face. Flanged joints shall be packed with impregnated asbestos gaskets placed inside the bolt circle with graphite applied to both faces.

C. Dielectric unions shall be provided between ferrous and non-ferrous piping to prevent galvanic corrosion. The dielectric unions shall meet the requirements for tensile strength of pipe fittings in accordance with Federal Specification WW-U-531 and shall be suitable for temperatures and pressures encountered. The ends shall be threaded, flanged, brazed, or soldered to match adjacent piping. The metal parts of the union shall be separated so that the electrical current is below 1 percent of the galvanic current which would exist with metal to metal contact.

2.10 THERMOMETERS AND PRESSURE GUAGES

A. Straight Thermometers:

1. Where indicated on the Drawings, furnish and install 7 in. long die-cast aluminum case, "Adjustable Angle" red appearing mercury tubing thermometers, H.O. Trerice Co., Cat. A001 complete with separable stainless steel Type 304 socket, 30 degrees to 240 degrees F. range, and lagging extensions when installed in insulated pipe.

2. Thermometers to be adjusted to a position for maximum readability from normal operator's position.

3. Thermometers shall be H.O. Trerice Co., Weksler Instruments Corp., Weiss Instruments, or approved equal.

B. Pressure Gauges: Pressure gauges shall be as manufactured by Trerice, or approved equal, Series 600, 4-1/2 in. diameter, range 0 to 100 PSI (or other range as required by application), aluminum case, white face with black figures, with petcocks. Where shown on plans, for natural gas service, provide gas rated pressure gauge with 2.5" dial with a pressure range of 0 to 35" water column.

C. Provide separable stainless steel wells for each thermometer and pressure gauge. Wells for thermometers shall be filled with heat conductive gel prior to installation of thermometer.

2.11 INSULATION

A. General

1. Provide materials complying with NFPA Bulletin 90-A, as determined by UL method NFPA 225-ASTM E 84, and complying with the governing code, with flame spread rating under 25 and smoke developed rating under 50.
2. Where vapor barriers are used, provide intact and continuous throughout.
3. Acceptable manufacturers:
   - Owes/Corning Fiberglass
   - Manville
   - Certainteed

B. Outdoor Air Ductwork

1. All new and disturbed existing outdoor air ductwork including combustion air ductwork and outdoor and relief/exhaust air louver plenums shall be insulated with 2.2 inch thick flexible blanket duct insulation with vapor barrier, 1.0 lbs. per ft. density glass fiber with maximum K factor of 0.22 at 75 degree F mean temperature with fire retardant foil/Kraft (FSK) vapor barrier facing. Product shall be Owens Corning SOFTR™ Type 100 or equal. All seams and joints shall be taped with matching kraft paper vapor barrier tape. Minimum installed R-value shall be 8.

2. Louver plenum blank off panels shall consist of 2 layers of 20-gauge aluminum sandwiching a 2" rigid board polyiso board insulation. All edges shall be encapsulated with aluminum so no exposed insulation exists.

C. Piping Insulation

1. All new and existing disturbed hot water piping (supply and return) shall be insulated with 2" thick pipe insulation. Hot water piping insulation shall be equivalent to Owens Corning Fiberglas™ SSL II with paper free polymer all service jacket.

2. Provide Zeston or equal polymer fittings at all elbows and fittings.

3. Seal all joints and seams vapor tight. For piping 2" or greater in size provide pipe cradles at all hangers. Provide 14 gauge 18" insulation shields at every hanger. Vapor barrier must be maintained continuously on all piping.

2.12 FLUE VENTING & COMBUSTION AIR

A. Furnish and install, where shown on the Drawings boiler flue venting as manufactured by Metal Fab, Heat Fab or Pro Tech Systems. Refer to specification section on Boilers for additional flue venting requirements for boilers.

B. For the non-condensing boilers provide material as shown on the plans, Category III. Material within the building shall be double wall insulated type similar to Metal Fab #IPIC, Duravent Duraseal model #DSD or equal. inner gas carrying pipe of type 316L stainless steel for gas. There shall be a nominal one (1) inch air space between the walls. The outer jacket shall be type 441 stainless steel. The materials and construction of the modular sections and accessories shall be as specified by the terms of the product's UL listing. A capped tee to support future counterweighted barometric damper shall also be provided for each boiler. Tee may be capped pending start-up and draft testing.

C. For the non-condensing boiler venting within the existing masonry chimney provide a #316L stainless steel masonry chimney liner similar to DuraVent DuraSeal model DS, Metal Fab or equal with all fittings, hangers, supports and accessories including but not limited to elbow, multiple straight sections (approx. vertical chimney height is 30 feet (V.I.F.)), base plate or multiple guy supports, stainless steel guy wires (if used), centering bands, supports & anchors, storm & flashing collars and rain cap

D. For the new condensing boiler provide material as shown on the plans, Category IV. Materials shall conform to all manufacturer's recommendations and shall be constructed of AL-29-4C Stainless Steel Positive Pressure U/L 1738 Listed Vent System. Inner liner shall be AL29-4C and outer wrapper shall be 430 grade Stainless Steel. An air gap shall be provided between inner and outer sections.

E. Provide all components required for complete system. Venting systems including, but not limited to, pipe sections, tees and elbows, drains, cleanouts, supports, variable lengths, ventilated roof thimble assembly, stack caps. All components exposed shall be constructed of stainless steel.

F. On combustion air intakes for direct vented boilers utilize galvanized Sheetmetal insulated with R-8 insulation. Refer to section on ductwork and Insulation for additional information.

G. All flue venting shall be installed in accordance with the manufacturer's published installation instructions.

H. Condensing boiler vent shall drip to acid neutralizing system furnished by boiler manufacturer.

I. All venting work must be completed by a Massachusetts licensed plumber or gas fitter.

2.13 LP GAS BURNERS

A. Provide two (2) modulating gas burners to support the existing hot water boilers. The burner shall have been IBR tested on the specified boiler and meet UL, CSD1 and Massachusetts requirements. Burner shall meet UL and ULC code. The burner shall be as indicated on the schedule and approved for use by the Boiler Manufacturer as an appropriate Burner for use on the boiler. They will be designed to burn up to the rated (see schedule) LP gas per hour. The Burners shall come with a one year parts warranty. The Burner shall come standard with modulating operation, service slide bars for ease of maintenance, an integrated Control Panel and a characterized fully adjustable cam assembly. It shall have high efficiency fan, insulated air intake housing for low noise operation, a die cast aluminum chassis and exterior drawer assembly adjustment screw for quick adjust insertion depth to fine tune air flow pattern for shaping the flame geometry.

B. Electrical work: Install electrical devices furnished by the manufacturer but not specified to be factory mounted. Furnish copy of manufacturers wiring diagram submittal to the Owner, include factory wired "as-built" schematic in O&M manuals.

C. All burner control wiring from the Burner Mounted Control Panels and Burner Primary Controls, Limits, Operating controls, switches and additional control devices shall be furnished and installed under this section of the work by the HVAC Subcontractor and shall conform to all codes and standards. HVAC contractor shall utilize licensed electricals for all control relate wiring if required by code. All power wiring, devices and work shall be completed by a licensed electrician (filed sub-bid refer to 26.00.00). Burner shall be wired through an emergency shut-off switch located outside the room.

D. All wiring of every description, except for power wiring and disconnect switch provided by the Electrical Subcontractor, shall be provided by the HVAC Subcontractor. Without limiting the generality thereof, this shall include all wiring from, remote interlocking devices as well as all safety, combustion and operating devices remote from panel, emergency switches, pressure switches, potentiometers indicating and measuring devices.

E. Burner blower motor shall be as scheduled furnished for operation on 3 Phase/208-230 Volts/60 Hz. Or as otherwise required by site conditions. Control circuit shall be taken from a separate two-wire branch circuit, one side grounded, not exceeding 120 Volts, line to line. All safety control switching shall be accomplished in the hot ungrounded conductor and through the 24V low voltage wiring provided by the burner manufacturer and in accordance with the manufacturer's instructions and recommendations.

F. Control system wiring shall comply with ASME CSD-1 requirements. An electrical thermal switch fused to break the ungrounded conductor in the main circuit at 165^{o} F. Shall be installed in the main power line within six feet over the top of each Burner. If the ceiling above the Burner exceeds 12 Ft. In height, an additional thermal switch shall be installed on the ceiling and series connected with the lower switch. Fuse protection for the control circuit shall be provided. Two (2) manually operated remote heating plant shutdown switch shall be furnished and installed just outside the Boiler room doors (inside exterior door) and shall be marked for easy identification. Shutdown switch(es) must be wired to disconnect all power to the Boiler controls.

G. All wiring for Boiler and Burner shall be rated for the maximum operating temperature to which it may be exposed. All wiring between components shall have copper conductors not less than 18 AWG and constructed in accordance with the NEC/NFPA 70. All field installed romex, conduit, junction boxes and the like shall be installed so as not to interfere with the Boiler manufacturers recommended cleaning and maintenance procedures.

H. Gas Burner shall be U.L. listed, configured to comply with 248 CMR 7.00; 527 CMR 4.00; and ASME CSD-1 requirements. Burner shall be listed by the Boiler manufacturer, tested to I=B=R standards and capacities. Burners shall be approved by the State Fire Marshal and listed by the Mass. Gas Regulatory Board. Gas burner must be rated to obtain maximum scheduled capacity at an incoming LP supply gas pressure as low as 11" w.c.

I. Multi-pole switch with center "OFF" position; Low Fire hold switch. Provide the following factory installed switches and isolating relays:

Combustion air damper relay, one relay per burner.
Alarm with silencing switch and relays, wired to alarm each of the specified conditions that will generate a Lockout condition.
Alarm relay to initiate a remote alarm on Control Lockout. One relay per Burner.

Pilot Lights to indicate:
"Power On"
"Call For Heat"
"Fuel On"
"Alarm"
"Low Gas Pressure"
"High Gas Pressure"

M. Burner shall be furnished with an automatic gas ignition system and the Primary Control shall monitor the presence of the Main Flame. If the presence of the Main burner flame is not proved, provide for automatic shutoff of main gas.

N. Gas valve train shall be furnished in accordance with UL-795 requirements for Automatic Gas Fired Boilers, and shall comply fully with the 248 CMR 7.00 Massachusetts Fuel Gas Code for Gas Utilization Equipment in Large, to include not less than the following:

- Separate Pilot and separate Main Gas pressure regulators. Each regulator shall be designed for operation with up to a Maximum of 14" inches W.C. inlet gas pressure. Vent as required by 248 CMR 7.02(11)(C).
- Pilot and Main manual shutoff gas cocks. Manual shutoff gas cock larger than 2" inches shall be of the lubricated plug or ball type with stops.
- Dual Safety Shutoff Gas Valves piped in series and main manual leak test cocks. Dual Safety Shutoff Gas Valves, complete with actuators, shall be provided in the Main gas line to each Burner.
- One quarter inch (1/4") plugged tappings shall be provided, one of which shall be located upstream of the Main gas pressure regulator and another to be located near the Burner head to permit gas pressure readings with a Manometer.
- Gas pressure supervision shall be provided by listed pressure switches interlocked to accomplish a non-recycling safety shutdown in the event of High or Low gas pressure. High and Low gas pressure switches may be of ventless construction and not require vent lines to outside atmosphere if they comply with 248 CMR 7.00 requirements.
- Gas valve train components shall be furnished as specified above with the Pilot Gas train, and combustion air dampers and linkage installed and wired at the factory. All other components shall be furnished loose for field assembly. Gas valve train assembly shall be sized for use with a minimum inlet gas pressure of 5.00" inches W.C. at the inlet to the Main Gas pressure regulator.
- All Main gas and Pilot gas pressure regulators and High and Low gas pressure switches are to be independently vented to a safe outdoor location in accordance with 248 CMR 7.02(11)(C), State and Local Code requirements. Vent lines shall be of steel or wrought iron pipe, 3/4" inch IPS minimum and with a maximum length as directed by 248 CMR 7.02(11)(TABLE 2), which shall discharge to outside atmosphere. Pilot gas pressure regulators shall also be vented in accordance with 248 CMR 7.02(11)(C), unless constructed or equipped to limit the escape of gas from the vent opening in the event of diaphragm failure to not more than 2.5 cubic feet per hour. Vent lines from regulators shall not be connected into a common line with the bleed line from gas operated diaphragm valves or from pressure relief valves. All vent piping shall be by the Plumbing Contractor.

O. Furnish and install thermal cutoff switches and emergency burner shutoff switches as required by previously specified State and Local Codes.

P. If double acting barometric dampers are installed, thermal spill switches shall be integrated into the Burner circuit, wired to shut the Burner down in the event of flue gas spillage from the barometric damper exceeding 60 seconds duration.

2.14 HOT WATER BOILERS

A. Furnish and install as shown on plans in accordance with all codes and authorities having jurisdiction, a condensing type boiler plant as manufactured by Lochinvar, Viessman or Aerco. Boiler plant specified is Lochinvar Crest, consisting of one (1) boiler modules. Acceptable alternate boiler must be capable of properly operating (including full fire) at 10" w.c. entering LP gas pressure. Each boiler shall be UL/FM approved and have a total input of 2,000 mbh each with a gross published output of 1,924 mbh (dependent upon return water temperature) when fired with LP gas.

B. Boiler modules shall be of gas-fired, condensing fire tube design with a modulating power burner and positive pressure discharge. Each boiler shall be capable of 25:1 turndown of firing rate without loss of combustion efficiency. Heat exchanger/combustion chamber shall incorporate a helical fire tube design that will be self-supporting, baffle free, and warranted to withstand thermal shock. Heat exchanger shall be ASME stamped for a working pressure not less than 150 psig. Unit shall have an ASME approved relief valve with a setting of 50 psig. Exhaust manifold shall be of corrosion resistant porcelain enameled cast iron, with 8" diameter flue connection. Exhaust manifold shall have a gravity drain for the elimination of condensation with collecting reservoir. Boilers shall not require boiler pumps as minimum system flow shall meet the minimum flow requirements of the boilers. Minimum boiler flow shall be no greater than 25 GPM. Pressure drop through any one unit shall not exceed 4.0 psig under full load. Unit shall be suitable to accept system temperatures at any point along the system design reset schedule without thermal shock or condensation restriction.

C. The flame monitoring system shall incorporate a U/L recognized combustion safeguard system utilizing interrupted spark ignition and a rectification type flame sensor. An electro-hydraulic double seated safety shutoff valve shall be an inherent part of the gas train.

D. Each boiler module shall incorporate electric probe type low water cutoff and dual over temperature protection including a manual reset in accordance with ASME section IV and CSD-1. Remote fault alarm contacts, sensor failure detection, and auxiliary contacts shall be standard equipment. Boilers shall operate on 120 volt 1 phase. Different voltage and phase configurations shall be acceptable however it shall be this sections responsibility to coordinate the change with the CMR and electrical contractor an pay all cost associated with making this change.

E. All aspects of installation of Boiler Plant shall be in strict accordance with manufacturer's instructions. Materials shall conform to all manufacturers' recommendations and shall include a Stainless Steel AL-29-4C Positive Pressure U/L Listed Vent System. For boilers combined to a single vent provide approved common venting backflow device on each boiler. Boiler plant piping shall be field constructed of materials as specified. Each boiler shall have individually isolating shutoff valves for service and maintenance.

F. Boiler manufacturer shall supply as part of boiler package a completely integrated microprocessor based Boiler Management System, as furnished by boiler manufacturer, to control all operation and energy input of the multiple boiler plant. The system shall be comprised of a microprocessor based control utilizing pulse width modulation for bumpless transfer of header temperature and sequential firing. The controller shall be PID type for accurate temperature control with excellent frequency response. BMS shall provide contact closure for automatic adjustable heat start circuit for plant activation and have contact closure for auxiliary equipment such as pumps and combustion air dampers. The controller shall be fully Bacnet or Lon compatible as required by the existing building EMS system so that the building operator shall be capable of fully monitoring and controlling the boiler plant through the EMS front-end if the building EMS can support such interface.

G. The BMS will operate on an adjustable inverse ratio in response to outdoor temperature to control the main header temperature outlet to +/-2F. Units shall operate with an Inverse Efficiency Curve, with

known Part Load Value Efficiencies. Maximum efficiency shall be achieved at minimum firing input. Reset ratio shall be fully field adjustable from 0.3 to 3.0 in operation. The controller shall have LCD display for monitoring of all sensors and interlocks. Non-volatile backup of all control setpoint shall be internally provided as standard. Control will automatically balance operating time on each module by a first on-first off mode and provide for setback and remote alarm contacts. Connection between central BMS system and individual modules shall be twisted pair low voltage wiring to internal terminal strips for easy installation. System shall be enabled and disabled by the buildings energy management and control system as specified within this specification.

H. The pressure vessel of boiler shall carry an unconditional, non-prorated 10-year warranty against leakage due to defective materials or workmanship. The heat exchanger tubes/ combustion chamber assembly shall be warranted against failure due to thermal stress failure or condensate corrosion for a prorated five-year period. All components of the boiler shall be warranted for at least one full year. A Warranty Certificate must be issued to the owner from the manufacturer and a copy of warranty be submitted for engineers approval.

I. Contractor shall provide the services of a local factory authorized representative to supervise all phases of equipment startup. A letter of compliance with all factory recommendations and installation instructions shall be submitted to the engineer with operation and maintenance instructions.

J. Boilers shall be fitted with a variable speed primary pump as scheduled. Boiler controller shall operate and prove flow prior to allowing respective boiler to fire.

K. Boilers shall be furnished for 120 volt operation. Provide disconnect switches on power supply to each boiler.

L. Boilers shall be provided with full 1-year warranty along with a 10-year warranty on the heat exchanger.

M. Execution:

1. Preliminary requirements: Provide the services of a Company Field Advisor of the Boiler manufacturer for the following:

    a. To assist and review the installing contractor with the assembly and erection of each Boiler. Upon completion of the Boiler assemblies, the Boiler manufacturers Company Field Advisor shall certify the proper assembly and connection of each Boiler prior to startup.

    b. The boiler manufacturers Company Field Advisor shall be Present at time of Start-up to supervise the initial firing of the Boiler(s).

    c. The boiler manufacturers Company Field Advisor shall instruct Boiler Room Operating Personnel.

2. Provide four hold down bolts of at least 5/8-in. diameter into the concrete pad and fastened through the base channels of the Boiler.

3. Boiler drain valves shall be connected to the lowest water space available and shall be installed with pipe and fittings. Each blow-off valve shall be Brass, ball type, not less than 1-1/2 inch (or other sized by manuf.) minimum and rated equal to the pressure stamped on the Boiler and to a temperature rating of not less than 250^{o} F. and all blowdown discharges shall be arranged so as to allow the Operator to view the water that is discharged to drain. Ends of blowdown piping shall be cut at a 45^{o} Degree angle to prevent a cap or plug from being installed.

4. All boiler discharges shall be piped to floor drains or as indicated by the Consulting Engineer. Furnish and install all necessary pipe and fittings to connect the pressure relief valve discharge full size (Minimum Acceptable) to floor drain. Discharge shall be arranged so that there will be no danger of scalding Boiler room personnel in the event of a pressure relief situation. Size and arrangement of discharge piping shall be such that any pressure that may exist or develop will not reduce the relieving capacity of the relief valve below that required to protect the Boiler. All such discharge piping shall be supported by hangar or standoff to prevent the valve body from undue stress or strain.

5. Installing Contractor shall utilize capped tees at all turns in the return piping to the back section of each Boiler for cleaning of the return piping at or near each Boiler. Feedwater, makeup water and/or water treatment shall be introduced into the Boiler water through the return piping only. Provisions shall be made for the expansion and contraction of all hot water mains connected to each Boiler by providing substantial anchorage at suitable points and by providing swing joints so there will be no stress or strain transmitted to either Boiler. Stop valves shall be provided in the supply and return pipe connections to each Boiler permitting draining any Boiler without emptying the entire system.

6. After final assembly and connection, each Boiler shall be thoroughly cleaned internally following the manner described within the Boiler manufacturers installation instructions.

7. All field tests after the Boiler(s) have been installed and connected to the system shall be limited to not more than 80 PSI. Installing Contractor shall furnish all equipment, piping, labor, staging, fittings, valves, hoses and other materials and shall pay all required permits for Inspection as may be required to perform such tests as may be directed by these Contract Documents and as required by the Consulting Engineer and the State Boiler Inspector.

8. An initial Hydrostatic pressure test of 80 PSI shall be conducted on each Boiler for a period of not less than 5 hours. Tests shall be of such duration as necessary and as directed by the Consulting Engineer to ensure that the Boilers have been installed and piped correctly with no leaks or other improper operating conditions.

9. Installing Contractor shall contact and notify the State Boiler Inspector when the installation of the Boiler(s), Burner(s) and controls is substantially complete. Installing Contractor shall request an inspection of the Boilers to be conducted by the State Boiler Inspector and to have a Certificate of Inspection issued upon satisfactory inspection.

10. After receipt of certificate of Inspection, Installing Contractor shall furnish a suitable glass front frame in which to place said certificate. Frame, with Inspection certificate inserted therein, shall then be placed on or posted in a suitable location within the Boiler room in which the new Boilers have been installed.

11. Installing Contractor shall maintain all apparatus in satisfactory operating condition. Perform periodic Burner tune-up and cleaning of the Boiler fireside surfaces when dirty, provide preventative maintenance, perform turndown tests, conduct tests for Flame Safeguard, Combustion Efficiency, Draft tests, Limit Control tests and Safety Valve tests, check the ignition system and adjust, repair or replace any as necessary while the heating system is under his ownership and control and until such time as the Owner accepts the equipment, issues the Final certificate of Payment and assumes the full obligation of Ownership.

12. Installing Contractor shall note that any Warranty Service (Hereinafter specified) as may be absorbed by the authorized Service representative shall in no way absolve the Installing Contractor from any and all responsibility for the Care, Service and Preventative Maintenance for Materials

furnished to this Contract, while the Heating System is under his Control, and until final acceptance by the Owner.

13. Installing Contractor shall guarantee the entire installation for a period of One (1) Year from the date of Owner Acceptance and beneficial usage by the Owner and Date of Final Payment.

N. Commissioning:

1. An authorized representative of the Boiler or Burner manufacturer shall perform the initial start-up, final adjusting and testing of the Burners and Controls in the presence of the Owners Operating Personnel.

2. The process of Start-Up and Commissioning shall include Purging of the Boiler(s); Burner Operation Tests, including CO sampling, Stack Temperature(s); CO_2 sampling; Tests for Venting; Ignition Tests; Manifold Pressure Tests; Instruction to the Owner and all other such procedures as may be directed by the Consulting Engineer.

3. The final results of a Combustion Efficiency Test with all pertinent Combustion Data shall be logged onto a check sheet which shall be submitted to the Consulting Engineer to prove compliance with this section of the Specifications and for Record purposes.

4. Combustion efficiency testing shall include no less than the following:

   a. Sample and document CO_2 in the flue gas at Low and High rates of fire with recorded Gross and Net Stack Temperatures to establish stack loss value. Each Burner shall be set to operate at the overall best performance and combustion efficiency for which the equipment is designed and capable of.

   b. Adjustment and checkout of all aquastat controls, limits, switches, operating controls, low water cutoff devices, low voltage step control relays, combustion controls, and all Lockout conditions.

   c. He shall supervise purging of the Boiler(s). All required tests for proper venting which shall include setting and adjusting the Boiler outlet damper to the Boiler manufacturers specifications.

   d. Provide instruction to the Owners Operating Personnel in the procedures to resolve a "Lockout" condition. Operating personnel shall also be instructed in the Operation and routine daily maintenance of the Burner, Combustion Controls, Multiple Boiler Reset Control System and controls during the lightoff process. The Owner shall arrange to have the personnel who require training to be present at the Lightoff.

5. Factory Authorized Burner Service representative shall provide the initial Burner lightoff and One (1) Year of Warranty Burner service. This requirement shall not be waived, nor shall the responsibility for the Service Contract be assumed by any other party unless previously approved by the Consulting Engineer in writing.

6. Burner manufacturers service representative shall furnish One (1) Year of Warranty Burner Service on the Burner(s) and Control(s) which shall commence from the Date of Original Lightoff and shall continue Warranty Burner Service coverage up to and including the First Anniversary of Burner Lightoff.

7. Warranty burner service shall include labor and materials to replace any parts or controls, which might fail in service as the result of a defect in materials or manufacture. Normal wear and tear on

parts as the result of daily operation will not be included as "no charge" items (nozzles, ignitors, etc.) and other such devices, which may require replacement as the result of operation during the Warranty Service Contract shall not be included. Preventative maintenance, in the form of yearly tune-up and bi-yearly cleanings and adjustments shall be the responsibility of the Installing Contractor throughout the duration of the Warranty Contract while the equipment is under his control. Preventative maintenance, cleaning and routine adjustments shall not be performed by the warranty service Contractor but by the Owners obligated Service Company.

2.15 CENTRIFUGAL PUMP

A. Furnish and install where shown on the plans electric motor driven pumps as scheduled and specified. Pumps shall be in-line wet rotor type as scheduled and manufactured by Grundfos, Paco or Bell & Gossett.

B. Pumps shall have capacities as scheduled on the drawings. Pumps shall be selected to operate at or near their point of peak efficiency thus allowing for operation at capacities of approximately 25% beyond design capacity. In addition, the design impellar diameter shall be selected so that the design capacity of each pump (GPM and TDH) shall not exceed 90% of the capacity obtainable with maximum impellar diameter at the design speed for that model or as approved.

C. Boiler Pumps

1. Provide split coupled in-line pumps with integrated VFD (EC motor) similar to Grundfoss MAGNA. If pumps are to be set on floor slab provide base stand. Pumps shall be capable of communicating directly with the boiler controller for star/stop and speed control. EMS shall wire to pump from boiler controller. EMS shall interface to status output.

E. Vertical and horizontal in-line pumps must be supported with seismically restrained spring vibration isolating hangers between the pump and the pipe vibration isolator.

F. Motors shall be as scheduled and noted herein premium efficiency type capable of qualifying for a utility company rebate. ECM motors shall be provided where scheduled with all packaged skid mount pumps having ECM motors. All other pumps up to an including 2 HP shall have ECM motors.

G. Each motor on a VFD shall be provided with a shaft grounding device to harmlessly bleed potential induced shaft voltages to ground

I. Provide variable speed drives on all pumps where scheduled or specified herein. Note ECM motors need not have VFD’s. Refer to article Variable Frequency Drives for additional requirements.

J. Provide H-O-A Nema 1 disconnects on all pumps. Provide combination disconnect and motor starter for each pump not having an ECM motor, variable speed or integral speed drive. Coordinate coil voltage with control requirements.

2.16 SYSTEM WATER TREATMENT

A. All new systems shall be thoroughly flush with clear water. Drain water, clean all strainers and then refill the hot water system with clear water. Coordinate with school’s current chemical treatment vendor and program.

2.17 ELECTRICAL WORK

A. HVAC contractor shall be prime contractor on this project and shall carry division 26.00.00 Electrical as a filed sub-bid to perform all power wiring required to make the installation fully functional and operational.

B. The Heating, Ventilating and Air Conditioning Contractor shall provide all wiring for the Automatic Temperature Controls, boilers (interlock and control loop power) etc.. except as otherwise specified herein.

C. The HVAC contractor shall hire a licensed electrician to perform all control related wiring as required by code. Minimum gauge of all control wiring is 18 AWG. In addition, coordinate with project electrician and pay all costs associated with providing for power circuits necessary to support the automatic temperature controls.

D. The Electrical Contractor shall install and do all power wiring for all motor starters and unmounted motors, furnished to him at the job site by other trades.

E. For all low voltage motors, temperature control wiring and motor control wiring, including wiring for interlocking, shall be provided by the Section providing the motors, including the installation of all control devices.

F. Furnish all starters and all other motor control devices for motor driven equipment required for the work. It shall be the HVAC contractors responsibility to furnish motor starters for all the HVAC equipment of the NEMA class required, NEMA 1 for indoor starters, NEMA #3R for outdoor starters. The Electrical Contractor shall provide all code required disconnect switches for all motors, except where otherwise noted. The setting of all motors required for mechanical equipment shall be included as part of the mechanical work.

G. Equipment which includes a number of correlated electrical control devices mounted in a single enclosure or on a common base with equipment, shall be supplied for installation completely wired as a unit with terminal boxes and ample leads ready for external wiring.

H. All electrical items called for as part of the mechanical work shall conform to NEMA Standards, to the requirements of the National Fire Protection Association and to the requirements of any local electrical code authority having jurisdiction, any field modifications required to ensure such conformance shall be included as part of the mechanical work.

2.18 ELECTRIC MOTORS

A. This Contractor shall provide all electric motors necessary for driving all motor driven equipment required to be furnished under this section of the Specifications.

B. All motors shall be designed for 1 phase or 3 phase, 60 cycle alternating current operation with 208 volts across the motor terminals (unless otherwise scheduled or mandated by site power supply), except that, unless otherwise specified herein, all motors 1/3 HP and smaller shall be designed for single phase, 60 cycle alternating current at 120 volts across the terminals.

C. The speed, horsepower, type and other essential data for each motor, if not given under paragraphs describing the various motor driven apparatus, or in schedules on the drawings shall be submitted to the Engineer for his review. All two speed motors shall be single winding type.

D. Contractor shall furnish premium efficient motors eligible for rebate by the local electric utility, when applicable.

2.19 AUTOMATIC TEMPERATURE CONTROLS

A. Furnish and install all control components necessary to obtain a fully functional control system as described herein. The contractor is responsible for providing all controls, relays, etc. necessary to

accomplish the Sequence of Operations and performance specified whether or not the items are specifically identified herein. This shall include all the points shown in the control diagrams and on the drawings. Wherever a setpoint is referred to, this implies that the setting is adjustable by the user. Contractor shall hire the project electrician to provide additional power supplies to support the control devices as required. All controls operating equipment and systems configured to run off emergency power must be wired to the emergency power circuit. HVAC Contractor shall be responsible for updating the controls, logic & graphics.

B. The specified DDC system is based on an extension of the Owners current energy management system by Automated Logic. The control system shall connect to the owners existing central network bus. Contractor must revise graphics and points list of current system to reflect all new systems. This control system shall be referred to as the DDC, EMS or ATC system throughout this specification. If EMS system is Modbus or Bacnet Protocol compatibility it shall directly communicate with the boilers to obtain operation status of systems. Although these system may come with many local devices and sensors provided by the equipment manufacturer the EMS contractor must still provide external sensors and devices as required to achieve the sequence of operation and comply with the bid documents. Controls subcontractor must review specifications and clarify with respective mechanical sub-bidders to verify mechanical contractor is proposing to provide the equipment specified with communication interface specified. Awarded HVAC contractor must contact the Owner's control contractor, Automated Logic to coordinate the control work required of this project.

C. It shall be division 23.00.00 responsibility to provide all personnel as required to fully coordinate with the Owner's commissioning agent as applicable. The hours of training and instruction outlined in division 23.00.00 and the Testing and Balancing requirements shall be in addition to those tests and requirements required to fulfill the commissioning obligations.

D. General

1. The automatic temperature control system shall include, but not be limited to, the following components:
   - Front-end computer graphical software upgrades and modifications showing all building HVAC systems serving the project area. Real-time interface with controlled components.
   - Several stand-alone DDC control unit(s) networked together on a local LAN to control the environment in the entire building
   - Expansion modules for the controllers, if required, shall provide for the capability of additional DDC points.
   - End devices such as sensors, actuators, dampers and valves.
   - Control transformers and relays.
   - Control wiring between duct smoke detectors and the respective fan starters.
2. The failure of any single component shall not interrupt the control strategies of other operational devices.

E. OPERATOR INTERFACE / STATION

1. Upgrade Owners existing workstation software and graphics to support the new systems. All new systems shall be shown on dynamic color graphics. Include database creation and support; password access levels; alarm processing; data collection and trending; etc...

F. INPUT/OUTPUT INTERFACE

1. Digital Inputs (DI) shall allow the monitoring of on/off signals from remote devices. The digital inputs shall provide a wetting current of 12mA at 12vdc to be compatible with commonly available control devices.

2. Analog Inputs (AI) shall allow the monitoring of low voltage current or resistance signals and shall have a minimum resolution of 0.1% of the sensing range. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.

3. Digital Outputs (DO) shall provide a continuous low voltage signal for on/off control of remote devices. Where specified in the sequences of operations or indicated on the points list, digital outputs shall have 3-position (on/off/auto) override switches, status lights, and shall be selectable for either normally open or normally closed positions.

4. Analog Outputs (AO) shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10vdc or a 4 to 20 mA signal as required to provide proper control of the output device.

G. AUXILIARY CONTROL DEVICES

1. Temperature Sensors

   a. Temperature sensors shall be Resistance Temperature Detector (RTD) type or thermistors, as dictated by the requirements of this specification. Final location of all space sensors shall be coordinated with the Owner and Engineer.

   b. Immersion sensors shall be provided with a separable stainless steel well. Wells for thermometers shall be filled with heat conductive gel prior to installation of thermometer.

   c. Sensor accuracy's and operating ranges shall be as follows:
      - Space temp. +/- 1 deg. F, 0 to 130 deg. F range
      - Duct temp. +/- 1 deg. F, 30 to 160 deg. F range
      - O.A. Duct temp. +/- 1 deg. F, -30 to 160 deg. F range
      - Water +/- 1 deg. F, 0 to 200 deg. F range

2. Relative Humidity Sensors

   a. Relative humidity sensors shall be thin film capacitor type with an accuracy of +/- 2% with a range of 10% to 90%. For enthalpy calculations provide on North wall for outdoor air sensing and one in each AHU main return air duct and elsewhere as shown on the control drawings or indicated herein. Final location of all space sensors shall be coordinated with the Owner and Engineer. Space sensors shall be wall-mounted type.

3. Flow Switch

   a. Provide flow switch of type and style recommended by boiler manufacturer for variable flow pumping at each boiler. Current sensing run indicators shall be provided at each pump. Sensor shall be able to differentiate between bearing loss and motor failure and report to the workstation as such.

4. Dampers and Actuators

   a. Dampers shall be opposed blade spring closed powered open type (dampers are not needed for combustion air). All damper blades shall be double wall insulated ultra-low leakage type with neoprene gasketed edge seals rated for no more than 3CFM/SF leakage at 1" w.g.. Actuators shall be electronic, spring return, low voltage (24v) and properly selected for the required torque and speed. Actuators shall be fully proportioning for the upper louver damper and 2-postion type for the power louver damper.

H. OPERATOR INTERFACE SOFTWARE

1. Alarms

    a. The stand-alone DDC unit shall provide visual notification of equipment failures, program failures, hardware failures or sensor failures. In addition, each sensor and point shall be individual alarmed for values in excess of their respective high/low limits or status. When an alarm is detected, it shall be automatically stored and the user notified by displaying a message on the front display panel.

    b. An alarm for the boiler plant shall report out to designate officials via the EMS system via pager or cell phone (as available and coordinated with Owner) during a high-level alarm condition as follows:
    - Boiler Alarm/Failure
    - Water supply temp greater than 10 degrees below setpoint for longer than 60 minutes.

2. Scheduling

    a. The scheduling program in the stand-alone DDC unit shall provide daily, weekly and calendar scheduling capability. The master schedule shall be capable of being individually edited for each day of the week and holidays.

3. Communications

    a. The controller shall communicate on a network bus. In addition, dial-out and in modem capabilities shall be included. The system shall be accessible via the web from any remote computer with web browser software. Owner shall furnish a dedicated phone line and internet connection for use by the system. Contractor shall program system to dial out alarms to a predefined party and send alarms to the Owner's security monitoring company.

I. SEQUENCE OF OPERATION – HYDRONIC HEATING BOILERS (EXISTING AND NEW)

1. The existing EMS controls shall be modified to support the addition of the new boiler, indirect water heater and associated pumps. The existing boiler sequence shall be modified to ensure the new boiler HWB-3 is the lead boiler at all times followed by HWB-1 and HWB-2. The operation of HWB-1 and 2 shall be rotated based on run-time for even service and wear. The program shall also include an alternate run time option, whereas at the users discretion they may allow the new HWB-3 boiler to be also be rotated based on heating demand run time with the other boilers. However, this shall only occur when the hot water supply temperature is required to be above 160°F.
2. The existing system mixing valve and associated boiler isolation valves control water flow through HWB-1 and HWB-2. The existing programming shall be modified to ensure the 3-way valve does not close to return water flow any less than 50% (adjustable) when the HWB-3 boiler is being called to operate in heating mode. 3-Way valve shall not be limited to bypass return water if HWB-3 is in domestic hot water priority mode at which time the valve shall operate as currently configured. Final sequence shall be coordinated between the Engineer and the Owner's proprietary control vendor prior to submittal review.
3. The new condensing boiler shall be controlled by a microprocessor based pre-engineered and programmed control system furnished by the boiler manufacturer. The control system shall be furnished as specified in this specification for Boiler Units. The boiler shall be enabled and hot water supply temp. reset by the EMS.
4. The new burners on the existing boilers shall be enabled by the EMS and firing rate controlled by a microprocessor based pre-engineered and programmed control system furnished by the burner

manufacturer. The control system shall be furnished as specified in this specification for Burner Units.

5. All boiler/burner control wiring from burner control panels to multiple boiler control system, boiler isolation valves, combustion air dampers, primary controls, operating controls, limits, switches, and additional control devices as required shall be furnished and installed by the Automatic Temperature Control Contractor per manufacturer's instructions. The boiler controller shall have system supply and return water sensors and outdoor air sensors wire directly to the factory panel.

6. When the indirect water heater (IWH-1) tank aquastat drops below an initial setpoint of 135°F, a domestic hot water priority command shall be sent to HWB-3. BP-1 shall be commanded off, IWP-1 shall be commanded on and HWB-3 shall fire with a supply water temp. limit initially set for 180°F until the tank reaches a temperature a setpoint of 150°F after which the boiler shall operate normally based on heating demand.

7. The DDC shall monitor the boilers via hard points as well as thru Modbus and/or BACnet protocol software but as a minimum interface must allow user to view all operating points, firing rates, etc….

8. Emergency off/on switch shall be provided outside of the boiler room and inside the exterior door and shall be wired to disable all boilers and report a priority alarm condition to the EMS.

9. Boilers system shall be enabled by the EMS system. The existing boiler plant enable/disable sequence and associated setpoints shall be modified to incorporate the new boiler and heating pump operation shall remain as it currently exists with the exception that the boiler controller shall enable the boiler pump prior to allowing the HWB-3 boiler to fire when called for.

10. In general, the boiler plant shall be enabled at outdoor temperatures below 60 degrees F or if there is more than 3 calls for heat from the building systems. The EMS shall stage the boilers and modulate boiler fire (integral on HWB-1 & 2) to reset HW supply temperature based on outdoor air temperature.

11. The main HWS temp. shall be reset as follows:

Supply Water	O.A.Temp
180 °F	10 °F
110 °F	60 °F

5. DDC Point List - Hydronic Boiler Control (NEW or MODIFIED POINTS)

   a. As a minimum, the following new and/or modified points shall be hard wired monitored and controlled although, the front-end shall be capable of viewing all boiler points through Modbus or BacNet as available via the existing EMS system.

Inputs:	Output
O.A. temperature AI (existing)	HWB-3 enable/disable DO
Common HW supply temp. AI	Boiler Pump BP-1 (control by HWB-3)
Common HW return temp. AI	HWB-1 enable/disable DO
Boiler loop HW supply temp. AI	HWB-2 enable/disable DO
Boiler flame failure/alarm DI (3)	HWB-3 HW reset AO
Boiler status DI (3)	DHW Demand AO
Boiler Emergency Start/Stop DI (2)	IWP-1 enable/disable DO
DHW (IWH-1) Tank Temp AI	
HWB-1 Boiler firing rate and supply water temperature (via Modbus & BacNet via EMS)	

HWB-2 Boiler firing rate and supply water temperature (via Modbus & BacNet via EMS)
HWB-3 Boiler firing rate and supply water temperature (via Modbus & BacNet via EMS)

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of heating, ventilating and air conditioning system will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install equipment ductwork, piping and controls where shown with recognized industry standards and practices, to ensure that installation complies with requirements and serves intended purposes.

B. Coordinate with other work as necessary to interface installation of ductwork, piping and equipment with other components of systems.

C. Installation of Ductwork:

1. Installation of ductwork shall be coordinated with other work as necessary to interface installation or ductwork with other components of systems. Duct sizes shown on the drawings at connection to fans or other equipment may vary in actual installation. Contractor shall provide transition pieces as required. Ducts, casings and hangers shall be installed straight and level and shall be free of vibration and noise when fans are operating.

2. Provide safing to close all floor and wall (where fire rated) openings around ductwork - pack annular space with rockwool and 18 gauge sheet metal safing.

3. Seal the ductwork at joists and seams with water based sealers similar to DuctMate EZ-Seal or approved equal.

4. When ductwork penetrates an insulated joist bay in the attic area, maintain insulation integrity. Support ductwork to prevent movement and secure insulation and fill all gaps.

5. 1/8” thick galvanized steel angle irons shall be used to support ductwork mounted on the roof. Angles shall be securely fastened to the ductwork and the roof before installation of the roofing membrane. Roofer shall flash in angle supports.

6. This contractor is responsible for sleeving all duct penetrations before pouring of slab. If additional holes are required this contractor shall have pay for the coring of such holes in coordination with the general contractor and with prior consent of the Architect.

D. Installation of Piping:

1. HVAC Subcontractor shall examine location where the piping is to be installed and determine space conditions. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the Drawings or required to complete the installation intended by these Specifications.

2. All drain piping from condensate drain pans shall be properly trapped in accordance with the static pressures involved. Condensate drain piping sizes shall be not less than 3/4 inch.

3. Provide fire safing to seal all floor and wall (where fire rated) openings around piping.

4. Provide 24 hour duration pressure test for all piping systems. Test pipe with clear water (propylene glycol mix if freezing could occur) at 1.5 times the system design pressure unless a more stringent or lengthy test is required by the local AHJ or under other Divisions. Any products or materials not rated for this pressure or the relief pressure must be isolated from the test. Provide a temporary 100 psi relief device on the tested system(s) to avoid damage due to thermal expansion during the test. Record ambient and system water pressure and temperature at start and end of test and report to Engineer. Inspect piping for leaks and if any are found repair and repeat test.

5. All systems shall be thoroughly flushed with clear water and then filled with clear water and circulated for a period no less than 8 hours. Drain water, clean all strainers and then refill the hot water system with clean water and chemically treat. Provide a report to Owner, Architect and Commissioning Agent within one week of completion of flushing and cleaning. Bleed new and existing systems of all air introduced as part of this project.

6. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid or flexible, where required, grooved-end-pipe couplings. All grooved system components shall be of same manufacturer. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. A grooved factory trained field representative shall provide on-site training for HVAC Subcontractor's field personnel in the use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically review the product installation. Only a direct employee of the grooved system manufacturer shall be considered suitable for field service. A distributor’s representative is not to be considered qualified for field service. HVAC Subcontractor shall remove and replace any improperly installed products

7. This contractor is responsible for coring of all holes related to his/her work.

E. Installation of Equipment:

1. Contractor shall examine location where equipment is to be installed and determine space conditions and notify Architect, in writing, of conditions detrimental to proper and timely completion of work.

2. Install equipment where shown in accordance with manufacturer's written instructions.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of the automatic temperature control system and after motors have been energized with normal power source, test system to demonstrate compliance with requirements. When possible, field correct malfunctioning controls then retest to demonstrate compliance. Replace controls which cannot be satisfactorily corrected. Refer to Section - Test and Balancing.

3.04 SERVICE

A. After completion of the control system installation, the controls contractor shall regulate and adjust all thermostats, control valves, damper motors, etc., and place in complete operating condition, subject to the approval of the Owner. Complete instructions shall be given to the operating personnel. There shall be one day of instruction given on the operation of the entire system.

3.05 TESTING, ADJUSTING AND BALANCING

A. All piping and equipment shall be tested. Test shall be performed in the presence of and to the satisfaction of the Owner and such other parties as may have legal jurisdiction.

B. In no case shall piping, equipment or accessories be subjected to pressure exceeding their ratings.

C. All defective work shall be promptly repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the approval of the Architect.

D. All new and existing systems shall be filled and purged of air and all systems shall be made fully operational at the completion of the work.

F. Water System Procedures:
Adjustments:
1. Adjust all balancing valves to provide the required fluid flow rate and pressure drop to, or through, each components.

G. Heating System Procedures:

1. Adjust heating systems to provide required quantity to, or through, each component.

2. Measure quantities and pressures with calibrated meters.

3. Use venturi tubes, orifices, or other metering fittings and pressure gauges to measure flow rates and to balance systems.

H. Certified Reports:

1. For the reports required to be submitted under Article 1.3 of this Section, provide certification by an independent balancing and testing contractor who is versed in the field of air balancing and who is not affiliated with any firm involved in the design or construction phases of this work.

2. Identify in the reports each item not complying with the Contract requirements, or obvious mis-operation or design deficiencies of equipment or controls.

3.06 LABELING

A. Provide pipe markers of either pressure sensitive tape or laminated plastic, color coded and indicating the type and direction of flow of the piping service. All new heating supply and return water and condensate drain piping throughout the boiler room shall be labeled. Labels shall be at the inlet and outlet to each piece of equipment and at intervals along the pipe of a minimum of every 20 feet.

B. All equipment & starters shall be labeled with engraved laminated nametags.

C. 1-1/2” Brass valve tags with recessed stamped black lettering indicating service and valve number shall be provided at every shut-off, bypass and control valve in the building. A typed valve chart shall be made and inserted in each copy of the operation and maintenance. In addition, the valve chart shall be mounted in a glass frame affixed to a wall in the boiler room. Edit existing valve chart where

applicable. Chart shall show valve number, valve type and valve service. Directions for system seasonal drain down or isolation of components shall be included on this chart.

D. In the boiler room at the hot water boiler acid neutralizing device that states: “Replace limestone chips annually.

3.07 PAINTING

A. Equipment installed under this Section shall have shop coat of factory applied non-lead paint, unless otherwise specified. Touch-up any scratches with matching paint. Hangers and supports shall have one coat of non-lead primer.

B. All new gas piping shall be painted with 1-coat of rust inhibiting primer and final coated with ANSI yellow and properly labeled “LP Gas”. Gas piping upstream of the regulator must be labeled “2 PSI Gas”.

3.08 MECHANICAL DEMOLITION

A. All existing mechanical equipment, piping, ductwork, valves, hangers, supports, and fittings indicated on the Drawings to be removed, or as otherwise required to complete the Work of this Contract, shall be removed under the Work of this Section.

B. All existing utility connections to existing mechanical equipment to be removed shall be disconnected, capped, and made safe in accordance with requirements of the Contract Documents and local authorities having jurisdiction. All plugs and caps to be installed shall be of like material as the pipe being capped or plugged. Disconnection and capping of all utility connections shall be performed by the respective utility subcontractor for Mechanical carried by the General Contractor in Section - Form For General Bid.

END OF SECTION 23.00.00

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Section 26 00 01
ELECTRICAL WORK
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.2 TIME, MANNER AND REQUIREMENTS FOR SUBMITTING FILED SUB-BIDS:

A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.
   1. Specification requirements for the Trade Contract “ELECTRICAL WORK” include all of the following listed Specification Sections: in their entirety:
      a. Section 260001 - Electrical Work
      b. Section 260500 - Common Work Results for Electrical
      c. Section 260519 - Electrical Power Conductors and Cables
      d. Section 260526 - Grounding and Bonding for Electrical Systems
      e. Section 260529 - Hangers and Supports for Electrical Systems
      f. Section 260533 - Raceway and Boxes for Electrical Systems
      g. Section 260548 - Vibration and Seismic Controls for Electrical Systems
      h. Section 260553 - Identification for Electrical Systems
      i. Section 262816 - Enclosed Switches and Circuit Breakers
      j. Section 283111 - Addressable Fire-Alarm System

B. Sub-Bids for work under this Section shall be for the complete work and shall be bid electronically per Section 00 21 13 Instructions to Bidders.

C. Additional Requirements:
   1. Trade contract bidder’s attention is directed to Massachusetts G.L. Chapter 149 §44H, as amended, which provides in part as follows:
   2. Each trade-contract bidder shall list in Paragraph E of the "Form for Filed Sub-Bid" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for that sub-subtrade requires such listing, provided that, in the absence of a contrary provision in the Specifications, any sub-bidder may, without listing any bid price, list his own name or part thereof and perform that work with persons on his own payroll, if such sub-bidders, after sub-bid openings, shows to the satisfaction of the Awarding Authority that he does customarily perform such class of work with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following classes of work shall be listed in Paragraph E under the conditions indicated herein.

      None

D. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:
   1. The Work of this Trade Contract is shown on the following Drawings:

      E-1 and E-2.

   2. Related items which may require coordination or impact work of this trade are shown on the following Drawings:
      a. N/A
   3. The complete List of Drawings for the Project is provided in Section 00 01 15.
   4. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

1.3 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

   1. All Work of the following sections:
      a. Electrical Distribution
      b. Interior and Exterior Lighting and Power
      c. Common Work Results for Electrical
      d. Electrical Power Conductors and Cables
      e. Grounding and Bonding for Electrical Systems
      f. Hangers and Supports for Electrical Systems
      g. Raceway and Boxes for Electrical Systems
      h. Vibration and Seismic Controls for Electrical Systems
      i. Identification for Electrical Systems
      j. Enclosed Switches and Circuit Breakers
      k. Addressable Fire-Alarm System

   2. Firestopping for the Work of this Section, including cutting penetrations and firestopping; complying with requirements specified in Section 078413 - PENETRATION FIRESTOPPING.
      a. The electrical contractor shall repair any existing applied fireproofing on steel beams that they damage or remove as a result of attachments to support their electrical work. .Refer them to specification section 078100 – Applied Fireproofing Patching
   3. Core drilling for the Work of this Section.
   4. Certified seismic restraints to meet the Commonwealth of Massachusetts Building Code applicable at the time the building permit is issued.
   5. Coordination drawings and record drawings and similar requirements.

B. Items to Be Installed Only: Install the following items as furnished by the designated Sections:
   1. Section 230001 - HEATING, VENTILATING AND AIR CONDITIONING:
      a. Power connections for control panels, pumps, fans, electric unit heaters.
      b. Magnetic starters.

C. Items to Be Furnished Only: Furnish the following items for installation by the designated Sections:
   a. N/A

D. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
   1. Section 230001 – HEATING, VENTILATING AND AIR CONDITIONING for coordination with HVAC piping and ductwork, motors, and DDC wiring except 120 VAC power to control panel as indicated on the Drawings

E. The Electrical Sub-Contractor shall be responsible for filing all documents, payment of all fees, and securing of all inspections and approvals necessary for the electrical work.

F. The Electrical Sub-Contractor shall carry in the bid price all Utility Company and Municipal back charges for all materials furnished and work performed by them in conjunction with this Contract and pay same to the respective agency upon demand. The Electrical Sub-Contractor shall not be entitled to additional compensation after the submittal of his bid price should he fail, for any reason, to obtain the total back charge costs to be incurred by the local utility companies or municipal agencies.

1.4 SUBMITTALS

A. Comply with requirements specified in Section 013300 – SUBMITTAL REQUIREMENTS.

B. Shop Drawing: Shop drawings shall include, but not be limited to, the following:
   1. Electrical Work
   2. Common Work Results for Electrical
   3. Electrical Power Conductors and Cables
   4. Grounding and Bonding for Electrical Systems
   5. Hangers and Supports for Electrical Systems
   6. Raceway and Boxes for Electrical Systems
   7. Vibration and Seismic Controls for Electrical Systems
   8. Identification for Electrical Systems
   9. Enclosed Switches and Circuit Breakers
   10. Addressable Fire-Alarm System

1.5 REFERENCES

A. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any electrical item in the drawings or specifications for electrical work carries with it the instruction to furnish, install and connect the item as part of the electrical work, regardless of whether or not this instruction is explicitly stated.

B. It shall be understood that the specifications and drawings for electrical work are complimentary and are to be taken together for a complete interpretation of the electrical work except that indications on the drawings, which refer to an individual element of work, take precedence over the specifications where they conflict with same.

1.6 REGULATORY REQUIREMENTS

A. Comply with all applicable federal and state laws, and all local codes, by-laws and ordinances.

B. Where provisions of the Contract Documents conflict with any codes, rules or regulations, the latter shall govern. Where the contract requirements are in excess of applicable codes, rules or regulations, the contract provisions shall govern unless the Designer rules otherwise.

C. Request inspections from authorities having jurisdiction, obtain all permits and pay for all fees and inspection certificates as applicable and/or required. All permits and certificates shall be turned over to the Owner's Project Manager s at the completion of the work. Copies of permits shall be given to the resident engineer prior to the start of work.

D. Unless otherwise specified or indicated, materials and workmanship and equipment performance shall conform with the latest edition of the following standards, codes, specifications, requirements and regulations:

1. State Building Code
2. State Electrical Code
3. National Fire Protection Association (NFPA)
4. Local Town Regulations and By-laws
5. Underwriter's Laboratories, Inc. (UL)
6. National Electrical Manufacturer's Association (NEMA)
7. American National Standards Institute (ANSI)

E. All electrical work shall meet or exceed any other state and local codes and/or authorities having jurisdiction including all other standards indicated herein.

1.7 SURVEYS AND MEASUREMENTS

A. Base all required measurements, both horizontal and vertical, on reference points established by the Construction Manager and be responsible for the correct laying out of the electrical work. In the event of a discrepancy between actual measurements and those indicated, notify the Construction Manager in writing, and do not proceed with the work required until written instructions have been issued by the Construction Manager.

1.8 COORDINATION

A. HVAC, Plumbing, Fire Protection, 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. Work shall be performed in cooperation with other trades on the project and so scheduled as to allow speedy and efficient completion of the work.

C. Furnish to other trades advance information on locations and sizes of all frames, boxes, sleeves and openings needed for their work, and also furnish information and shop

drawings necessary to permit trades affected by the work to install same properly and without delay.

D. 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. Where the electrical work shall interfere with the work of other trades, assist in working out the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owner, make reasonable modifications to the work as required by normal structural interferences. Pay the Construction Manager for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.

E. If any electrical work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the electrical trades involved without extra cost to the Owner.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Designer for review and approval.

G. Protect all materials and work of other trades from damage which may be caused by the electrical work, and repair all damages without extra cost to the Owner.

1.9 MECHANICAL AND ELECTRICAL COORDINATION

A. Heating and Ventilating Subcontractor shall furnish and install various electrical items relating to the heating and ventilating equipment and control apparatus. The Electrical Subcontractor shall be required to connect power wiring to this equipment unless noted otherwise.

B. The Heating and Ventilating and Electrical Subcontractors shall coordinate their respective portions of the work, as well as the electrical characteristics of the heating and ventilating equipment.

C. All power wiring and local disconnect switches will be provided by the Electrical Subcontractor for the line voltage power. All control and interlocking wiring shall be the responsibility of the Heating and Ventilating Subcontractor.

D. 120V and above power wiring sources extended and connected to heating and ventilating control panels, transformers and switches shall be the responsibility of the Electrical Subcontractor. All low voltage thermostat, zone valve and any switch wiring shall be the responsibility of the Heating and Ventilating Subcontractor.

E. Temperature control and equipment wiring shall be installed by the Heating and Ventilating Subcontractor.

F. Pipe Tracing shall be furnished and installed by the specified subcontractor. Power connections shall be by the Electrical Subcontractor.

G. The Electrical Subcontractor will provide all magnetic starters except those furnished as an integral part of packaged equipment.

1.10 MECHANICAL AND ELECTRICAL COORDINATION DRAWINGS

A. Refer to Section 013100 – PROJECT MANAGEMENT AND COORDINATION for coordination drawing requirements

1.11 INSTALLATION REQUIREMENTS

A. The arrangement of all electrical work shown on the drawings is diagrammatic only and indicates the minimum requirements of the work. Conditions at the building including actual measurements shall determine the details of the installation. All work shall be laid out and installed so as to require the least amount of cutting and patching.

B. Check the architectural plans and specifications before ordering any material and equipment. Any discrepancies shall be brought to the attention of the Designer for his determination prior to proceeding with the work.

1.12 TYPICAL DETAILS

A. Typical details where shown on the drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the drawings, which in many cases are diagrammatic only, but with the intention that such details shall be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Designer.

1.13 SLEEVES, INSERTS

A. Furnish and install all sleeves, inserts, anchor bolts and similar items to be set into masonry or concrete, as required for mechanical and electrical work. Internal diameter of sleeve shall be 2" larger than the outside diameter of the pipe or insulation covered line passing through it.

1.14 ACCESSIBILITY

A. Install all work such that parts requiring periodic inspection, operation, maintenance and repair are readily accessible.

B. Furnish all access panels appropriate to particular conditions, to be installed by trades having responsibility for the construction of actual walls, floors or ceilings at required locations.

1.15 SUPPLEMENTARY SUPPORTING STEEL

A. Provide all supplementary steelwork required for mounting or supporting equipment and materials.

B. Steelwork shall be firmly connected to building construction as required.

C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with manufacturer's published requirements.

D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction; all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.

E. All manufactured steel parts and fittings shall be galvanized.

1.16 TOOLS AND EQUIPMENT

A. Provide all tools and equipment required for the fabrication and installation of the mechanical and electrical equipment at the site.

1.17 PORTABLE AND DETACHABLE PARTS

A. Contractors shall retain in their possession all portable and/or detachable parts and portions of materials, devices, equipment etc. necessary for the proper operation and maintenance of the mechanical and electrical systems until final completion of the work, at which time they shall be handed over to Owner’s Project Manager.

1.18 RECORD DRAWINGS, PROJECT CLOSEOUT

A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT.

B. This trade shall submit the record set for approval by the fire and building departments in a form acceptable to the departments, when required by the jurisdiction.

C. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.19 GUARANTEE/WARRANTY

A. Guarantee Work of this Section in writing for one year from the date of Certificate of Agency Use and Occupancy. Guarantees or warranties that start at the date of shipment from the factory, or from the completion date of an individual portion of the project, are not acceptable. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Designer's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

B. In addition to guarantee requirements of Division 01 and of Subparagraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in User Agency's name.

1. Upon receipt of notice from Owner's Project Manager of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by this Contractor without any reimbursement.
2. At nine months into the one-year guarantee period, the contractor shall perform a 100% test of all installed equipment. Any device and/or part found to be defective shall be repaired and/or replaced at no cost to the Owner. The Contractor shall notify the fire department one month in advance of the 100% test.
3. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Designer.
4. Provide 24-hour service beginning on the date the project is accepted by the Owner, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to the Owner. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Designer and Owner's Project Manager's approval. Submit name and a phone number that will be answered on a 24-hour basis each day of the week, for the duration of the service.
5. Submit copies of equipment and material warranties to Designer before final payment.
6. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to User Agency.
7. This Paragraph shall not be interpreted to limit Owner's rights under applicable codes and laws and under this Contract.
8. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph. Those paragraphs will govern.
9. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work by Owner's Project Manager and shall not initiate the guarantee period.
10. Non-durable items, such as electric lamps, shall be replaced up to the date of acceptance, such that they shall have had no more than 100 hours use prior to this date.
11. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately to Owner's Project Manager's satisfaction, advise Designer in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Designer will direct course of action.

1.20 OPERATING, INSTRUCTION AND MAINTENANCE MANUALS

A. Comply with requirements specified in Section 017700 – CONTRACT CLOSEOUT, including CAMIS spreadsheet data collection for Equipment Template and PM Procedure tabs.

B. Each copy of the approved operating and maintenance manual shall contain copies of approved shop drawings, equipment literature, cuts, bulletins, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed. Each manual shall have the following minimum contents:

1. TABLE OF CONTENTS
2. Introduction
   a. Explanation of manual and its purpose and use.
   b. Description of the electrical systems.

c. Safety precautions necessary for equipment.
d. Illustrations, schematics and diagrams.
e. Installation drawing.

3. Maintenance
   a. Maintenance and lubricating instructions.
   b. Replacement charts.
   c. Trouble shooting charts for equipment components.
   d. Testing instructions for each typical component.
   e. Two typed sets of instructions for ordering spare parts. Each set shall include name, price, telephone number and address of where they may be obtained.
4. Manufacturer's Literature
   a. The equipment for which shop drawings have been submitted and approved.
   b. Power Monitoring: Software and Firmware Operational Documentation:
      1) Software operating and upgrade manuals.
      2) Software licenses.
      3) Software service agreement.
      4) PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Provide separately for each PC.
      5) Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on compact disk or portable storage device with a USB interface of the hard-copy submittal.
      6) Program Software Backup: On compact disk or portable storage device with a USB interface, complete with data files.
      7) Device address list.
      8) Printout of software application and graphic screens.

1.21 SERVICE CHARACTERISTICS

A. Secondary Building Voltage - High Level: 480/277V

B. Secondary Building Voltage - Low Level: 208/120V

C. All equipment and wiring shall be suitable for the applied voltage.

1.22 QUALITY ASSURANCE

A. The requirements of the State Building Code and local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

B. All work shall comply with the latest editions of the codes as referenced herein.

C. Follow manufacturer's directions for articles furnished, in addition to directions shown on drawings or specified herein.

D. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to the Owner.

E. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

F. Equipment and materials shall:

1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed or labeled.
2. Be without blemish or defect.
3. Not be used for temporary light and power purposes.
4. Be in accordance with the latest applicable NEMA standards.
5. Be products which will meet with the acceptance of all authorities having jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested and certified.

G. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

H. For items which are to be installed but not purchased as part of the electrical work, the electrical work shall include:

1. The coordination of their delivery.
2. Their unloading from delivery trucks driven into any point on the property line at grade level.
3. Their safe handling and field storage up to the time of permanent placement in the project.
4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement if necessary, shall be coordinated with Contractor who originally purchased the item.
5. Their field make up and internal wiring as may be necessary for their proper operation.
6. Their mounting in place including the purchase and installation of all dunnage, supporting members, and fastenings necessary to adapt them to architectural and structural conditions.
7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these specifications.

I. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The electric work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.23 DELIVERY, STORAGE AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the products' and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage, shall not be used and shall be removed from the site.

B. Transformers: On receipt, inspect for and note any shipping damage to packaging and transformer.

1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.
2. Store in a warm, dry, and temperature-stable location in original shipping packaging.
3. Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
4. Follow manufacturer's instructions for lifting and transporting transformers.

1.24 TEMPORARY POWER AND LIGHTING

A. The Electrical Subcontractor shall furnish and install feeders of sufficient size from the Utility Company's power lines for the electric light and power requirements for the building while under construction and until the permanent feeders and related equipment have been installed and are in operation. Temporary lighting shall be based on a minimum of one watt per square foot covering each and every square foot of floor area in the building. Sufficient wiring, lamps, and outlets shall be installed to insure proper lighting in all rooms, space, stairwells, and corridors. Minimum sized lamp used shall be 100 watt. Where higher lighting intensities are required by Federal or State Standards of Laws or otherwise specified, the above specified wattage shall be increased to provide these increased intensities.

B. All necessary transformers, meters, cables, panelboards, switches, temporary lamp replacements and accessories required for the temporary light and power installation shall be provided by the Electrical Subcontractor.

C. The Electrical Subcontractor shall provide and maintain on each floor of the building, a feeder or feeders of sufficient capacity for the requirements of the entire floor and he shall provide a sufficient number of outlets, located at convenient points, so that extension cords of not over 50 ft. in length will reach all work requiring temporary light or power.

D. The Electrical Subcontractor shall install and maintain the wiring and accessories for the offices of the Construction Manager and Owner’s Project Manager as specified in the contract form.

E. All temporary electrical work shall meet the requirements of the National Electrical Code Article 305 Temporary Wiring, the Local Utility Company, and all Federal Standards and Laws.

F. All temporary wiring and accessories thereto installed by the Electrical Subcontractor shall be removed after their purposes have been served.

G. The Construction Manager will pay for the cost of electric energy consumed by himself and by all of his Subcontractors, unless otherwise indicated.

H. All lamps installed in permanent lighting fixtures and used for lighting during construction shall be replaced by the Electrical Subcontractor just prior to date of Use and Occupancy or Final Acceptance.

I. Provide all temporary lighting and power required above during the normal working hours of the project or a total of ten (10) hours per normal working day; Saturdays, Sundays and legal holidays are excluded. The ten hours per day shall include manning the temporary power and lighting 2 hour before and 2 hour after a normal eight (8) hour working day. 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. The Electrical Subcontractor will be compensated by the Construction Manager for any additional standby time, materials or equipment required by the Construction Manager or other Subcontractors beyond the normal working hours, as defined above.

1.25 STAGING AND SCAFFOLDING

A. Refer to requirements specified herein above.

1.26 EXTRA MATERIALS

A. Furnish extra materials described in following product specification sections that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

1.27 PHASING, DEMOLITION AND MAINTAINING EXISTING SERVICES

A. During the execution of the work, required relocation, 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 Designer 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 User Agency'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 User Agency's working schedule, as many times as required until all work is completed. Any outages of service shall be approved by Owner's Project Manager, prior to commencing the work. No outages or shutdowns of service shall occur without the written authorization of the Owner's Project Manager prior to commencing the work. Give notice of any scheduled shutdowns, a minimum of weeks in advance. User Agency 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 Designer and the Owner's Project Manager 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. 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 designed to be demolished shall be provided by the Electrical Subcontractor. Place all demolished electrical materials except hazardous materials (PCB lighting ballasts, fluorescent lamps, etc.) As determined by the Authority having jurisdiction in Construction Managers provided dumpster. All hazardous electrical materials shall be legally disposed by the electrical subcontractor.

D. Owner's Project Manager reserves the right to inspect the material scheduled for removal and salvage any items he deems usable as spare parts.

E. Phasing:

1. The Electrical Subcontractor shall construct the subject project in phases as directed by the Designer 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 SEQUENCING

A. Phasing: Refer to Section 01 10 00 - Summary, and Drawings for phasing and milestone completion requirements which affect the General Contractor's Work and the Work of this Filed Subcontract.

B. Coordinate work of this Filed Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

C. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.

D. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

2.2 SCAFFOLDS, STAGING, AND OTHER SIMILAR RAISED PLATFORMS

A. General: Filed Subcontractors 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 Filed Subcontractor 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 Filed Sub-Trade requiring such scaffolding.

2. Each Filed Subcontractor 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. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Filed Subcontractor.

4. Enclose all exterior scaffolding outside of the construction fence with 8-foot-high plywood enclosure at end of each workday to prohibit access to the scaffolding by unauthorized individuals.

PART 3 - EXECUTION

NOT USED

End of Section

Section 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. Section Includes:
   1. Sleeves for raceways and cables.
   2. Sleeve seals.
   3. Grout.
   4. Common electrical installation requirements.

1.3 SUBMITTALS

A. Product Data: For sleeve seals.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Manufacturers
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Or approved equal.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   3. Pressure Plates: Carbon steel Include two for each sealing element.
   4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants".

J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

End of Section

Section 26 05 19
ELECTRICAL POWER CONDUCTORS AND CABLES
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.
   3. Sleeves and sleeve seals for cables.

1.3 SUBMITTALS

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

B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 WARRANTY

A. Comply with Section 260001.

B. The Electrical Trade Contractor shall warranty that all materials furnished shall be free from defects of material for a period of one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: 90 degree rated; Comply with NEMA WC 70 for THHN, THWN-2 and XHHW-2.

C. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

D. Emergency System Feeders: Emergency System Feeders: Mineral-insulated, metal-sheathed cable, Type MI.

2.2 CONNECTORS AND SPLICES

A. Manufacturers
1. AFC Cable Systems, Inc.
2. 3M; Electrical Products Division.
3. Tyco Electronics Corp.
4. Or approved equal.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.4 SLEEVE SEALS

A. Manufacturers
1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.
4. Or approved equal.

B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
1. Sealing Elements: EPDM or NBR interlocking links suitable for the application shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Carbon steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Service Entrance: Type XHHW-2, single conductors in raceway.

D. Exposed Feeders: Type THHN-THWN-2, single conductors in raceway.

E. Emergency System Feeders in non-corrosive copper or brass environments: Mineral-insulated, metal-sheathed cable, Type MI.

F. Emergency System Feeders direct-buried: Mineral-insulated, metal-sheathed cable, Type MI with an extruded outer polyolefin jacket to provide additional protection.

G. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN-2, single conductors in raceway.

H. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN-2, single conductors in raceway.

I. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN-2, single conductors in raceway.

J. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN-2, single conductors in raceway; Metal-clad cable, Type MC.

K. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN-2, single conductors in raceway.

L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

M. Class 1 Control Circuits: Type THHN-THWN-2, in raceway.

N. Class 2 Control Circuits: Type THHN-THWN-2, in raceway.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
   1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

D. Cut sleeves to length for mounting flush with both wall surfaces.

E. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

F. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."

I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."

J. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

K. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.

3.4 SLEEVE-SEAL INSTALLATION

A. Install to seal underground exterior-wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:
1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

C. Test Reports: Prepare a written report to record the following:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

End of Section

Section 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

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

B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

1.5 WARRANTY

A. Comply with Section 260001.

B. The Electrical Trade Contractor shall warranty that all materials furnished shall be free from defects of material for a period of one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
   7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
   1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; 3/4-inch by10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

C. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
   4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
   1. Feeders and branch circuits.
   2. Lighting circuits.
   3. Receptacle circuits.
   4. Single-phase motor and appliance branch circuits.
   5. Three-phase motor and appliance branch circuits.
   6. Flexible raceway runs.
   7. Armored and metal-clad cable runs.
   8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
   1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
   2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
   2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

F. Grounding for Lightning Protection System: Install 3/0 AWG copper grounding conductor, in conduit, to the building's main service ground busbar.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

End of Section

Section 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. Section includes:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.4 SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
   1. Trapeze hangers. Include Product Data for components.
   2. Steel slotted channel systems. Include Product Data for components.
   3. Equipment supports.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers
      a. Cooper B-Line, Inc.; a division of Cooper Industries.
      b. Thomas & Betts Corporation.
      c. Unistrut; Tyco International, Ltd.
      d. Or approved equal.
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
      a. Manufacturers
         1) Hilti Inc.
         2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         3) MKT Fastening, LLC.
         4) Or approved equal.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   a. Manufacturers
      1) Cooper B-Line, Inc.; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti Inc.
      4) Or approved equal.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps.

C. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
   6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
   7. To Light Steel: Sheet metal screws.
   8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

F. The Electrical Subcontractor shall install all hangers and supports for electrical systems prior to fireproofing.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Concrete bases shall be provided by the general contractor.

B. The Electrical Subcontractor shall provide the anchor-bolt pattern to the General Contractor for installation of anchor bolts.

C. The Electrical Subcontractor shall provide to the General Contractor the layout of conduit and other materials that penetrate the equipment pads.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

End of Section

Section 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. See Division 26 for exterior duct banks and manholes, and underground handholes, boxes, and utility construction.

1.3 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 WARRANTY

A. Comply with Section 260001.

B. The Electrical Trade Contractor shall warranty that all materials furnished shall be free from defects of material for a period of one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. EMT: ANSI C80.3.

C. FMC: Zinc-coated steel.

D. LFMC: Flexible steel conduit with PVC jacket.

E. Fittings for Conduit (Including all Types and Flexible and Liquid tight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
   2. Fittings for EMT: Steel, set screw or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

B. LFNC: UL 1660.

C. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

D. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

A. Manufacturers
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Square D; Schneider Electric.
   4. Or approved equal.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1 and Type 3R (exterior) unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type.

E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

A. Manufacturers
   1. Hoffman.
   2. Lamson & Sessions.
   3. Carlon Electrical Products.
   4. Or approved equal.

B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with Snap-On cover and mechanically coupled connections with plastic fasteners.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with Snap-On covers. Manufacturer's standard enamel finish shall be custom color by architect.
   1. Manufacturers
      a. Thomas & Betts Corporation.
      b. Walker Systems, Inc.; Wiremold Company (The).
      c. Wiremold Company (The); Electrical Sales Division.
      d. Or approved equal.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture from manufacturer's standard. Finish shall be custom color by architect.
   1. Manufacturers
      a. Panduit Corp.
      b. Walker Systems, Inc.; Wiremold Company (The).
      c. Wiremold Company (The); Electrical Sales Division.
      d. Or approved equal.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

D. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.

E. Nonmetallic Floor Boxes: Nonadjustable, round.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

I. Cabinets:
   1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
   1. Exposed Conduit: Rigid steel conduit.
   2. Concealed Conduit, Above ground: Rigid steel conduit; EMT.
   3. Underground Conduit outside the foundation wall: RNC, Schedule 80 PVC, direct buried. Convert nonmetallic conduit to rigid steel conduit before rising through earth.
   4. Underground Conduit within building confines: RMC, direct buried or RNC, Schedule 80 PVC, direct buried. Convert nonmetallic conduit to rigid steel conduit before rising through earth.
   5. Exposed or underground conduit to sewage ejector pump chamber: PVC coated rigid steel conduit.
   6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   7. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT. Includes raceways in the following locations:
      a. Gymnasium.
      b. Open corridors and classrooms.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
      a. Gymnasium.
      b. Open corridors and classrooms.
   3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms.
      d. Fire pump room.
      e. Kitchen.
   4. Concealed in Ceilings and Interior Walls and Partitions: EMT.

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit.
7. Raceways for Optical Fiber or Communications Cable: EMT or plenum rated inner duct.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
9. Exposed or underground conduit to sewage ejector pump chamber: PVC coated rigid steel conduit.
10. Exposed or underground conduit to acid neutralization chamber: PVC coated rigid steel conduit.

C. Minimum Raceway Size: 1/2-inch (16-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project. Run conduits under floor slab as if exposed.

I. Restrictions Applicable to EMT
1. Do not install underground.
2. Do not encase in concrete, mortar, grout, or other cementitious materials.
3. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.

4. Do not use in hazardous areas.
5. Do not use outdoors.
6. Do not use in fire pump rooms.

J. Restrictions Applicable to Nonmetallic Conduit
   1. PVC Schedule 40 and PVC Schedule 80
      a. Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, and other such areas.
      b. Do not use in hazardous (classified) areas.
      c. Do not use in fire pump rooms.
      d. Do not use in penetrating fire-rated walls or partitions, or fire-rated floors.
      e. Do not use above grade.
      f. Convert nonmetallic conduit, to rigid steel conduit before rising through floor slab.

K. Restrictions Applicable to Flexible Conduit
   1. Use only as specified in paragraph FLEXIBLE CONNECTIONS. Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

L. Service Entrance Conduit, Underground
   1. PVC, Type-EPC 40, galvanized rigid steel.
   2. Convert nonmetallic conduit to rigid steel conduit before rising through floor slab.

M. Underground Conduit Other Than Service Entrance
   1. Tape Wrapped rigid steel; PVC, Type EPC-40. Convert nonmetallic conduit to rigid steel conduit before rising through floor slab. Ten mil tape shall be 1/2 lapped and extend a minimum of 6 inches above floor.
   2. Convert nonmetallic conduit to rigid steel conduit before rising through floor slab.

N. Conduit Installed Under Floor Slabs
   1. Conduit run under floor slab shall be located a minimum of 12 inches below the vapor barrier. Seal around conduits at penetrations thru vapor barrier.
   2. The Electrical Subcontractor will provide and pay for excavations and backfill for under grade slab conduit runs and coordinate the same with other utilities.
   3. All structural fill/bedding material must be installed in accordance with the earthwork specifications, including compaction.

O. Conduit Through Floor Slabs
   1. Where conduits rise through floor slabs, curved portion of bends shall not be visible above finished slab.
   2. Convert nonmetallic conduit to rigid steel conduit before rising through floor slab.

P. Conduit Installed in Concrete Floor Slabs
   1. Rigid steel; PVC, Type EPC-40. Locate so as not to adversely affect structural strength of slabs. Install conduit within middle one-third of concrete slab. Do not stack conduits.
   2. Space conduits horizontally not closer than three diameters, except at cabinet locations. Curved portions of bends shall not be visible above finish slab.
   3. Increase slab thickness as necessary to provide minimum one-inch cover over conduit.
   4. Where embedded conduits cross building and/or expansion joints, provide suitable watertight expansion/deflection fittings and bonding jumpers.

Expansion/deflection fittings shall allow horizontal and vertical movement of raceway.

5. Conduit larger than one-inch trade size shall be parallel with or at right angles to main reinforcement; when at right angles to reinforcement, conduit shall be close to one of supports of slab.
6. Where nonmetallic conduit is used, raceway shall be converted to rigid steel before rising above floor, unless specifically indicated.

Q. Stub-Ups
1. Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.
2. Convert nonmetallic conduit to rigid steel conduit before rising through floor slab.

R. Conduit Support
1. Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work.
2. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load.
3. Fasteners attached to concrete ceiling shall be vibration resistant and shock resistant.
4. Holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes.
5. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system.
6. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts.
7. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems.
8. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Support exposed risers in wire shafts of multistory buildings by U-clamp hangers at each floor level and at 10-foot maximum intervals.
9. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means.
10. For conduits greater than 2 1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

S. Directional Changes in Conduit Runs
1. Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent

plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

T. Locknuts and Bushings
   1. Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

U. Flexible Connections
   1. Provide flexible steel conduit between 3 and 6 feet in length for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size shall be 1/2-inch diameter. Provide liquid tight flexible conduit in wet and damp locations and in fire pump rooms for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

V. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

W. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

X. Raceways for Optical Fiber and Communications Cable: Install as follows:
   1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
   2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
   3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

Y. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by NFPA 70.

Z. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).
   1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) change.
      b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.

c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
d. Attics: 135 deg F (75 deg C) temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

AA. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi recessed lighting fixtures,]equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

BB. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall.

CC. Set metal floor boxes level and flush with finished floor surface.

DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
a. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches (75 mm) of concrete.
b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits, placing them 24 inches (600 mm) O.C. Align planks along the width and along the centerline of conduit.

End of Section

Section 26 05 48
VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. Section includes:
1. Isolation pads.
2. Spring isolators.
3. Restrained spring isolators.
4. Channel support systems.
5. Restraint cables.
6. Hanger rod stiffeners.
7. Anchorage bushings and washers.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:
1. Site Class as Defined in the State Building Code.
2. Assigned Seismic Use Group or Building Category as Defined in the State Building Code.

1.4 SUBMITTALS

A. Product Data: For the following.
1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
   a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
   b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

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

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
    a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.
2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:
    a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Welding certificates.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Or approved equal.

B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
   1. Resilient Material: Oil- and water-resistant neoprene.

C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
   1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
   6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
   1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
   2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
   3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Amber/Booth Company, Inc.
   2. California Dynamics Corporation.
   3. Cooper B-Line, Inc.; a division of Cooper Industries.
   4. Or approved equal.

B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: [Steel tube or steel slotted-support-system sleeve with internally bolted connections] [Reinforcing steel angle clamped] to hanger rod. Do not weld stiffeners to rods.

F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchors and studs.

G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices.

H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:
   1. Install restrained isolators on electrical equipment.
   2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
   3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

D. Drilled-in Anchors:
   1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
   2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
   3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
   4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
   5. Set anchors to manufacturer's recommended torque, using a torque wrench.
   6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
   2. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
   3. Test to 90 percent of rated proof load of device.
   4. Measure isolator restraint clearance.
   5. Measure isolator deflection.
   6. Verify snubber minimum clearances.
   7. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

End of Section

Section 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Identification for conductors and communication and control cable.
   2. Warning labels and signs.
   3. Equipment identification labels.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

PART 2 - PRODUCTS

2.1 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount

permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.

C. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, preprinted.

D. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

E. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

F. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

G. Fasteners for Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

H. Warning label and sign shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 mm)."

2.2 ELECTRICAL SYSTEM IDENTIFICATION

A. Manufacturers:
   1. T&B.
   2. 3M
   3. EMED Co.
   4. Or approved equal.

B. Identification of Equipment:
   1. All pieces of major electrical equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way.
   2. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, junction boxes, etc., by marking them. All items of equipment, pull boxes, junction boxes, etc., shall be clearly marked using engraved nameplates as hereinafter specified. The item of equipment shall indicate the same number as shown on the Drawings, where applicable.
   3. White background and black letters equipment nameplates shall be three ply laminated plastic, a minimum of 3/32" thick, black background, white letters for normal power, red background, white letters for emergency power, and blue-white-blue for UPS power. Letters shall be similar to Roman Gothic of a size that

is legible (1/2" minimum for main nameplates and 3/8" minimum for branch device nameplates) and appropriate to the application. Attachment of nameplates shall be by stainless steel screws. Rivets or adhesives are not acceptable.

a. Electrical equipment to be identified includes: All switchgear, switchboards, unit substations, distribution panels, transformers, motor control centers, panelboards, automatic transfer switches, busway plugs, disconnect switches, motor controller/starters, lighting control panels, pull boxes, junction boxes, and similar equipment.

b. Nameplates on switchgear, switchboards, unit substations, automatic transfer switches, transformers, distribution panels, motor control centers, disconnect switches, motor controller/starters, variable frequency drives and panelboards shall give voltage and current characteristics and the source feeding the panel. Current characteristics shall indicate the size of the overcurrent devices serving the equipment and not the equipment current rating.

   1) Provide panel and circuit designation on disconnect switches, motor controllers/starters, variable frequency drives, etc.

Example:

PANEL PP2
120/208V, 3PH, 4 W, 225 A
Fed from DPA-3
Room 1.102

c. Individual overcurrent devices and pilot lights in switchgear, switchboards, unit substations, distribution panels, motor control centers, and similar equipment shall have nameplates showing the load served and its location, where remote. Nameplates on motor starters shall indicate variable speed, time delay operation, etc., where applicable.

d. Blank nameplates shall be mounted on each spare or bussed space in motor control centers, and on each spare or space in distribution panels.

e. Branch circuit panelboards shall have neatly typed circuit directories behind clear plastic. Identify circuits by room numbers. Room numbers shall be those finally selected by the Owner; not necessarily those given on contract Drawings. Spares and spaces shall be indicated with erasable pencil; not typed. Circuit numbers shall be provided in the directory and at each circuit breaker.

C. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces, to distinguish each run as either a normal power, emergency power, fire alarm, control wiring or voice/data conduit. Except as otherwise indicated, use white banding with black lettering except that emergency power orange and white, fire alarm conduit markers shall use red banding. Provide self-adhesive or snap-on type plastic markers. Indicate voltage ratings of conductors exceeding 250 volts. Locate markers at ends of conduit runs, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 30' along each run of exposed conduit.

D. Cable Tray Systems: Provide engraved nameplates identifying cable tray systems as to use, on maximum 50' centers on all tray systems and whenever a tray enters a room or concealed accessible location. Nameplate text shall be submitted to the Engineer for review.

E. Underground Cable Identification: Bury a continuous, preprinted, red and silver metallic ribbon cable marker, Brady No. 91600 Series or an approved equal with each underground cable (or group of cables), regardless of whether conductors are in conduit or direct buried. Locate each directly over cables, 12" above cable below finished grade. Ribbons shall be detectable from above grade using a pipe or cable locator.

F. Cable/Conductor Identification: Coordinate a uniform and consistent scheme of color identification of power wiring throughout the building system. Identification shall be by the permanent color of the selected covering. On large conductors, secure identification by means of painted color banding or plastic tape.

1. Color scheme shall be as follows, [or as required to match the existing color coding in the building for 120/240 V systems with high leg provide Orange for phase B]

	208/120 Volt	480/277 Volt	5kV/15kV
Phase A	Black	Brown	Black
Phase B	Red	Purple	Red
Phase C	Blue	Yellow	Blue
Neutral	White	Gray	White
Ground	Green	Green	

2. Wiring for switches shall be same color as phase wire.
3. Colored insulation in sizes up through #4. Conductors #3 and larger may have black insulation, but color coded with 1/2" wide band of colored tape, at accessible locations. Rap conductor minimum 6" width.
4. Feeder cables shall be tagged in pull boxes, wireways, wiring gutters of panels, and at other accessible locations. Tags shall be fireproof, nonconductive material, approved by Architect.
5. Maintain same conductor color from service entrance to last device.

G. Phase Rotation: Phase rotation shall be maintained throughout the project.

1. Phase rotation shall be clockwise or counterclockwise, per serving power company standards, A-B-C, and identified as such left-to-night, top-to-bottom, and front-to-back with color coding as specified above at switchboards, panelboards, substations, transformers, motor control centers, motor starters, and similar locations.
2. Motor phase reversal, if necessary, shall be made at motor controller.

H. Branch Circuit and Control Wiring Tags: All branch circuit and control wiring conductors shall be tagged using self-sticking vinyl cloth or mylar cloth wire markers. Embossed pressure sensitive plastic or metal ribbon markers will not be accepted. Tags shall be installed at all wiring splice, tap and termination points and shall correspond to the designations shown on the control wiring diagrams or panel schedules.

I. Branch Circuit Pull Boxes and Junction Boxes: Branch circuit pull boxes shall be neatly stenciled with a black permanent marker indicating the panel name and branch circuit number. Boxes on emergency power systems shall be painted orange prior to marking. Boxes on fire alarm power systems shall be painted red prior to marking.

J. Miscellaneous Switch Plates or Device Plates: Adhesive Film Label with Clear Protective Overlay for interior use: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

1. Nomenclature shall include the panel and circuit of the outlet or switch, or the indication of the pilot, or the area of control, or equipment served.

2. Switched and non-switched device plates shall be engraved. Engraving shall be 3/16" condensed Gothic and shall be filled with black enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

3.2 CLEANING AND PAINTING OF ELECTRICAL WORK

A. Prime, protective and touch-up painting is included in the Work of this Division. Finish painting in equipment spaces, concealed locations, and other locations not exposed to the view of building occupants is included in the work of this Division. Finished painting in areas exposed to the view of building occupants is specified under Division 9.

B. All equipment and materials furnished by the electrical subcontractor shall be delivered to the job with suitable factory protective finish.

C. Electrical switchgear, disconnect switches, contactors, etc., with suitable factory-applied finishes shall not be repainted; except for aesthetic reasons where located in finished areas as directed by the Architect and in a color selected by the Architect. Where factory-applied finishes are damaged in transit, storage or installation, or before final acceptance, they shall be restored to factory-fresh condition by competent refinishers using the spray process.

D. All equipment not finished at the factory shall be given a prime coat and then finish painted with two coats of enamel in a color as directed by the Architect/Engineer. No nameplates on equipment shall be painted, and suitable protection shall be afforded such plates to prevent their being rendered illegible during the painting operations.

E. The surfaces to be finish-painted shall first be prepared as follows:
   1. Galvanized and black steel surfaces shall first be painted with one coat of galvanized metal primer.
   2. Aluminum surfaces shall first be painted with one coat of zinc chromate primer.

F. All ferrous metal surfaces without a protective finish and not galvanized in exposed and concealed areas including chases, under floor and above ceilings shall be painted with two coats of zinc chromate primer as the construction progresses to protect against deterioration.

G. All junction and pull boxes and covers which are part of raceway systems distributing emergency power shall be painted orange. Where a multiple branch emergency power system is installed, the branch designation (LS, CB or EQ) shall be stenciled on the box cover in minimum one inch (1") high white letters.

H. All junction and pull boxes and covers and terminal cabinets which are part of the raceway/wiring system for emergency alarm wiring shall be painted orange and fire alarm wiring shall be painted red. A system designation (FA) shall be stenciled on the box or cabinet cover in minimum one inch (1") high white letters.

I. All conduit exposed to view shall be finish painted as directed by the Architect.

J. Before painting, all surfaces to be painted shall be suitably prepared. This shall include removing all oil, rust, scale, dirt, and other foreign material. Surfaces shall be made smooth by grinding, filing, brushing, or other approved method. In the painting operations, the primer for metal surfaces shall be of the zinc dust type unless specified otherwise, and where finish painting is specified, it shall be painted using materials and colors selected and approved by the Architect. Refer to Division 9 for additional requirements.

End of Section

Section 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS
(FILED SUB-BID REQUIRED AS PART OF SECTION 260001)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

1.2 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
   1. Fusible switches.
   2. Non-fusible switches.
   3. Molded-case circuit breakers.
   4. Enclosures.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 WARRANTY

A. Comply with Section 260001.

B. The Electrical Trade Contractor shall warranty that all materials furnished shall be free from defects of material for a period of one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FUSIBLE AND NONFUSIBLE SWITCHES

A. Available Manufacturers
   1. Eaton Corporation; Cutler-Hammer Products.
   2. General Electric Co.; Electrical Distribution & Control Division.
   3. Square D/Group Schneider.
   4. Or approved equal.

B. Fusible Switch, 1200A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Non-fusible Switch1200 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:
   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
   3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.2 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:
   1. Eaton Corporation; Cutler-Hammer Products.
   2. General Electric Co.; Electrical Distribution & Control Division.
   3. Square D/Group Schneider.
   4. Or approved equal.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
   4. GFCI Circuit Breakers: Single- and two-pole configurations with [5] [30]-mA trip sensitivity.

C. Molded-Case Circuit-Breaker Features and Accessories:
   1. Standard frame sizes, trip ratings, and number of poles.
   2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
   3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.3 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
   1. Outdoor Locations: NEMA 250, Type 3R; Type 4X where noted.
   2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
   3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

B. Concrete base is specified in Division 26 and concrete materials are specified in Division 03.

C. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

D. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

E. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

G. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26.

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:
   1. Inspect mechanical and electrical connections.
   2. Verify switch and relay type and labeling verification.
   3. Verify rating of installed fuses.

B. Perform the following field tests and inspections and prepare test reports:
   1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

End of Section