TOWN OF SWAMPSCOTT

PROJECT MANUAL

FOR THE

BOILER REPLACEMENT

AT

HADLEY ELEMENTARY SCHOOL

SWAMPSCOTT, MASSACHUSETTS

PROJECT MANUAL
BID DOCUMENTS

November 23, 2016

RDK ENGINEERS
200 Brickstone Square
Andover, Massachusetts

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END OF SECTION

SECTION 00 11 00

Boiler Replacement at Hadley Elementary School

ADVERTISEMENT

The Town of Swampscott, the Awarding Authority, invites sealed bids for the Boiler Replacement Project at the Hadley Elementary School located at 24 Redington Street, Swampscott, MA 01970 in accordance with the documents prepared by RDK Engineers.

The Project consists of the removal of fourteen (14) existing cast iron steam boilers, boiler feed system and piping. New work includes the installation of three (3) new vertical steel gas fired steam boiler and replacement of existing header and valves, new boiler feed system and reconnection of gas piping and breeching.

The Work, including all alternates for the project, is estimated to cost $353,780.00.

Bids are subject to M.G.L. c.149 §44A-J & to minimum wage rates as required by M.G.L. c.l49 §§26 to 27H inclusive. General bidders must be certified by the Division of Capital Asset Management (DCAMM) in the category of HVAC. DCAMM Certificates of Eligibility and Update Statements shall be submitted with bids showing bidder is approved to bid on project of this size and scope.

General Bids will be received until 2:00 p.m., Thursday, December 8, 2016 and will be publicly opened, forthwith.

All bids should be delivered to: Swampscott Public Schools, attn: Evan Katz, School Business Manager, located at 207 Forest Avenue, Swampscott, MA 01907; and received no later than the date & time specified above.

Bids shall be accompanied by a bid deposit that is not less than five (5%) of the greatest possible bid amount (considering all alternates. In lieu of a surety bond, cash, certified treasurer's or cashier's check made payable to the Town of Swampscott will also be accepted.)

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 working days (Saturdays, Sundays and legal holidays excluded) after the opening of bids.

The Awarding Authority reserves the right to waive any informality or to reject any or all bids.

Bid Forms and Contract Documents will be available for viewing and purchase at the Office of the School Business Manager, 207 Forest Street after 12:00 PM on Wednesday, November 23, 2016. They are also available for download at www.swampscott.k12.ma.us/pages/swampscottdistrict_tech/procurement/index under 'Open Procurements'. Only bidders registered with the City of Salem Purchasing Department will receive addenda notices.

There is a plan deposit of $75.00 per set (maximum of 2 sets) payable to The Town of Swampscott.

Deposits must be paid for by certified or cashier's check. This deposit will be refunded for up to two sets for bidders upon return of the sets in good condition within thirty days of receipt of general bids. Otherwise the deposit shall be the property of the Awarding Authority.

Additional sets may be purchased for $125.00

Bidders requesting Contract Documents to be mailed to them shall include a separate check for $40.00 per set for UPS Ground and $65 per set for overnight, payable to The Town of Swampscott to cover mail handling costs.

A Pre-Bid Meeting is scheduled for 11:00 AM, Wednesday, November 30, 2016 at the Hadley Elementary School, located at 24 Redington Street, Swampscott, MA 01907 to familiarize bidders with the advantages and difficulties of the project site.

Questions regarding this Invitation to Bid shall be submitted in writing to procurement@swampscott.k12.ma.us.

SECTION 00 11 16

INVITATION TO BID

Boiler Replacement at Hadley Elementary School

RECEIPT OF BIDS

The Town of Swampscott, the Awarding Authority, invites sealed bids for the Boiler Replacement Project at the Hadley Elementary School located at 24 Redington Street, Swampscott, MA 01970 in accordance with the documents prepared by Raymond Design Associates, Incorporated.

The Project consists of a small addition on a mini-pile foundation housing a new entrance vestibule and vertical lift to the second floor, exterior ramps, and the installation of an accessible toilet room.

The base bid Work, is estimated to cost $333,780.00.

Bids are subject to M.G.L. c.149 §44A-J & to minimum wage rates as required by M.G.L. c.l49 §§26 to 27H inclusive. General bidders must be certified by the Division of Capital Asset Management (DCAMM) in the category of HVAC. DCAMM Certificates of Eligibility and Update Statements shall be submitted with bids showing bidder is approved to bid on project of this size and scope.

General Bids will be received until 2:00 p.m., Thursday, December 8, 2016 and will be publicly opened, forthwith.

All bids should be delivered to: Swampscott Public Schools, attn: Evan Katz, School Business Manager, located at 207 Forest Avenue, Swampscott, MA; and received no later than the date & time specified above.

Work shall begin on or about December 15, 2016 and be substantially completed no later than February 3, 2016.

A Pre-Bid Meeting is scheduled for 11:00 AM, Wednesday, November 30, 2016 at the Hadley Elementary School, located at 24 Redington Street, Swampscott, MA 01907 to familiarize bidders with the advantages and difficulties of the project site and ask questions. Due to state law regarding CORI requirements, no Bidder will be permitted access at any other time. Any Prospective Bidder who attempts to access the building without prior approval will be escorted off the property.

Bidders are cautioned to carefully examine the contract documents and the documents relating to existing conditions. Attention is specifically directed to the requirements concerning the requirements of the prevailing wages, which is incorporated in the Contract Documents.

Bid Forms and Contract Documents will be available for viewing and purchase at the Office of the School Business Manager, 207 Forest Street, Swampscott, MA after 12:00 PM on Wednesday, November 23, 2016. They are also available for download at www.swampscott.k12.ma.us/pages/swampscottdistrict_tech/procurement/index under “Open Procurements. Only bidders registered will receive addenda notices.

There is a plan deposit of $75.00 per set (maximum of 2 sets) payable to The Town of Swampscott.

Deposits must be paid for by certified or cashier's check. This deposit will be refunded for up to two sets for bidders upon return of the sets in good condition within thirty days of receipt of general bids. Otherwise the deposit shall be the property of the Awarding Authority.

Additional sets may be purchased for $125.00.

Bidders requesting Contract Documents to be mailed to them shall include a separate check for $40.00 per set for UPS Ground and $65 per set for overnight, payable to The Town of Swampscott to cover mail handling costs.

All bids for this project are subject to the provisions of Massachusetts General Laws, Chapter 30, Section 39M, as amended and Massachusetts General Laws, Chapter 149, Section 26-27b inclusive and Section 44A-44J inclusive. Attention is directed to the minimum wage rates to be paid on the work as determined by the Commissioner of Labor and Workforce Development.

All bid deposits will be returned in accordance with applicable statutory provisions.

The Town of Swampscott will reject general bids when required to do so by the above-referenced General Laws. In addition, the Town of Swampscott reserves the right to waive any informality in bidding and to reject any and all bids if it deems it to be in the public interest to do so.

End of Section

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

PART 1- GENERAL INSTRUCTION AND REQUIREMENTS

1.1 BIDDING DOCUMENTS

A. Instructions to Bidders: This Instructions to Bidders contains important information about bidding procedures and is intended to provide guidance and assistance to bidders. This Instruction to Bidders does not change or supersede the provisions of M.G.L. Chapter 149, Section 44A-J or Chapter 30, Section 39M, or any other sections or provisions of Law or the Contract Documents.

Bid Forms and Contract Documents will be available for viewing and purchase at the Office of the School Business Manager, 207 Forest Avenue, Swampscott, MA 01907 after 12:00 PM on Wednesday, November 23, 2016. They are also available for download at www.swampscott.k12.ma.us/pages/swampscottdistrict_tech/procurement/index under 'Open Procurements'. Only bidders registered with the City of Salem Purchasing Department will receive addenda notices.

There is a plan deposit of $75.00 per set (maximum of 2 sets) payable to the Town of Swampscott. Deposits must be paid for electronically or by certified or cashier's check. This deposit will be refunded for up to two sets for bidders upon return of the sets in good condition within thirty days of receipt of general bids. Otherwise the deposit shall be the property of the Awarding Authority. Additional sets may be purchased for $125.00.

Bidders requesting Contract Documents to be mailed to them shall include a separate check for $40.00 per set for UPS Ground and $65.00 per set for overnight, payable to the Town of Swampscott, to cover mail handling costs.

1.2 BIDDING REQUIREMENTS

A. Site Visit Encouraged but Not Mandatory: Bidders may only visit the site by attending the pre-bid conference and site walk as referenced in the Invitation to Bid section, to become fully and completely aware of existing conditions, existing facilities, and the character of the operations to be carried on under the proposed Contract. Due to state law regarding CORI requirements, no Bidder will be permitted access at any other time. Any Prospective Bidder who attempts to access the building without prior approval will be escorted off the property. Each bidder shall fully understand the facilities, physical conditions, restrictions attending the work under the Contract.

Failure to make such examinations will not relieve the bidder from any obligation under the bidder's bid or sub-bid as submitted, nor shall it serve as the basis for change orders or equitable adjustments.

B. Document Examination: Each bidder shall thoroughly examine and become familiar with the Contract Documents and Bidding Documents. Failure to make such examinations will not relieve the bidder from any obligation under the bidder's bid as submitted, nor shall it serve as the basis for change orders or equitable adjustments.

1. Conflicts or Confusion: Prior to bidding, carefully study and compare the Contract Documents and request clarification in all cases of apparent conflict or confusion. In cases of

conflict or confusion where the Bidder did not request clarification prior to bidding, interpret the Contract Documents to require the greater quantity, higher quality, most restrictive, and most expensive of the possible interpretations.

C. Form of Agreement: An example Form of Owner-Contractor Agreement is included in the bidding documents.

D. Pre-Bid Conference at Site: An open, public pre-bid conference will be convened at the site to permit bidders to examine the site, examine existing conditions, and to ask questions. The date, time, and place of the Pre-Bid Conference are specified in the Invitation to Bid.

E. Applicable Laws: All bids are subject to all applicable provisions of law including, without limitation, M.G.L. Chapter 149, Sections 44A through 44J, and Chapter 30, Section 39M, as amended.

F. Eligibility of Bidders: In compliance with M.G.L. Chapter 149, Section 440, as amended, every bid shall be accompanied by a copy of a Certificate of Eligibility [DCAMM Form CQ1] issued by the Division of Capital Asset Management showing that the bidder has the classification and capacity rating to perform the work required by the Contract. Also, with the bid, provide a current Contractor's Update Statement on a copy of the Eligibility Update Form [DCAMM Form CQ3].

1. The DCAMM Classification Rating Required for General Bidders on this Contract is: **HVAC**.

2. Obtain Forms from DCAMM: Each Bidder shall obtain eligibility and update forms from DCAMM. Allow sufficient and ample time to permit DCAMM evaluation applications and issuance of Certificate of Eligibility.

3. Certificate of Eligibility and Update Statement Forms Are Required from Bidders: The Town of Swampscott will use the Certificates of Eligibility and Update Statement Forms to determine the lowest responsible eligible general bidder. General bids submitted without Certificate of Eligibility and Update Statement Form shall be invalid. Note: The Update Statement Form has been updated and is included in this project manual.

4. Public Records and Privacy: Contractor's Update Statement is not a public record as defined in M.G.L. Chapter 4, Section7, and will not be open to public inspection.

5. Written Request Required: Submit written request for clarification and interpretation to the Architect by e-mail to procurement@swampscott.k12.ma.us.

6. Time Required: Requests for clarification and interpretations must be received by the Architect at least five working days (Saturdays, Sundays, and holidays excluded) prior to the date bids are due.

7. Architect's Response Addenda: The Architect's response will be in the form of written Addenda, which shall become part of the Contract Documents. Clarifications and interpretations offered by the Town of Swampscott, the Architect, or any of the Architect's consultants in any form other than formal written Addenda shall be invalid. No Addenda will be issued later than 48 hours prior to the date for receipt of the Bids except an Addendum which includes postponement for the date of receipt of Bids.

8. Issuance of Addenda: Copies of Addenda will be available at locations where Contract Documents are filed for public inspection as listed in the Invitation to Bid and these Instructions to Bidders

9. Addenda Must Be Acknowledged: Bidders shall acknowledge Addenda in the spaces provided on the bid forms. Failure of a bidder to acknowledge Addenda in the spaces provided on the bid form may cause rejection of the bid. Failure of a bidder to receive any addenda shall not relieve it from

any obligation under its bid as submitted.

1.3 PREPARATION AND SUBMISSION OF BIDS

Bid shall be submitted on the bid forms provided. No changes shall be made in the phraseology of the bid or in the item or items mentioned therein. Bids must contain the name and proper address of the bidder and must be signed. If the Bidder is an individual, he/she should sign personally; if the bidder is a partnership, the name of the partnership should be followed by the signature of each general partner; and if the bidder is a corporation, the bid should be signed by the authorized officer whose signature must be attested to by the clerk/secretary of the corporation and the corporate seal should be affixed. Bids that are not complete or contain any omissions, erasures, alterations, or additions, or that contain irregularities of any kind may be rejected as informal.

A. Completion of Bid Forms: Use only the Bid Forms furnished with the bidding documents by the Awarding Authority. The Architect will not mail additional forms. Complete Bid Forms with typewriter or hand printed in ink.

B. Alterations Not Permitted: Do not alter bid forms. Do not include any recapitulation of the work to be done. Do not provide any information not requested. Do not strike out, line out, white out, or erase any information.

C. Amounts: Express amounts in both words and numbers where space for both is provided. In cases of conflict, written amounts shall control over numbers.

D. Blanks: Complete all spaces provided. Do not leave any blanks. Print N/C for "No Charge" or "0" for "zero" in any space not needed or used.

E. Bid Withdrawal: Any bid may be withdrawn by mailed written request, or faxed written request, prior to date and time for receipt of bids. Withdrawn bids may be resubmitted until date and time for receipt of bids.

1. Mailed Written Request: Bid withdrawal by mail shall be in writing and shall be received by the Town of Swampscott at the address where bids are to be received on or before the date and time of receipt of bids.

2. Faxed Written Request: Bid withdrawal by fax shall be in writing and shall be received by the Town of Swampscott on or before the date and time of receipt of bids.

F. Bid Deposit (Bid Security): A Bid Deposit (Bid Security) is required for each Bid in the amount of 5% of the total bid amount.

1. Forms of Bid Deposits: Forms of bid deposits shall be made payable to the Town of Swampscott and shall be in the form of certified check, bank treasurer's, or cashier's check issued by a responsible bank or trust company, or a bid bond issued by a surety company licensed to do business in the Commonwealth of Massachusetts. Form of bid bond must be acceptable to the Town of Swampscott.

2. Bidder Bid Deposit Return: Bid deposits of General Bidders will be returned within five working days after bid opening, except bid deposits of the three lowest general bidders will be retained by the Town of Swampscott until a Contract is signed.

G. General Bid Submission: Submit bid forms, bid deposit, Certificate of Eligibility, and Update Statement in a sealed envelope. Clearly and boldly identify envelope with 1) the name of the project; 2) the name of the Awarding Authority (Town of Swampscott); 3) the name, business, address, and business telephone number of the bidder; and 4) the words "Boiler Replacement at the Hadley Elementary School." Submit bids at the place, and by the date and time specified in the Invitation to Bid.

1.4 PERFORMANCE AND PAYMENT BONDS

A. Performance and Payment Bonds: The Bidder selected as Contractor shall furnish the Awarding Authority with a Performance Bond and a Labor and Materials Payment Bond in the full amount of the Contract Price including add alternates. Bonds shall be issued by a surety company licensed to do business in the Commonwealth of Massachusetts by the State Division of Insurance. Bond form shall be as bound in the Project Manual or other form approved by the Awarding Authority.

1. Changes in Contract Price: Whenever the Contract price is adjusted by Change Order; the General Contractor shall adjust the amount of both the Performance bond and a Labor and Materials Payment Bond to the new full amount of the Contract Price. The cost of this adjustment shall be included in the General Contractor's mark-up on the Change Order.

B. Bond Cost: All Performance Bonds and Labor and Material Payment Bond costs, required by the General Bidder shall be included in the Bid Amount and the Contractor shall pay all premiums for bonds.

C. Additional Bond Documents Required: With each bond provide certified power of Attorney or other certificate of authority where bond is executed by an agent, officer, or other representative of contractor or surety.

1.5 TAX EXEMPTION

A. Taxes: The Awarding Authority is exempt from payment of Massachusetts sales tax. Contractor purchases of materials and equipment for the Project are exempt to the extent allowed by M.G.L. Chapter 64H, Section 6.

B. The Town of Swampscott's Sales Tax Exemption Number will be provided to successful bidder.

C. Copies of Receipts Required: In compliance with IRS regulations, the Contractor shall provide the Town of Swampscott with copies of all receipts for materials and products used for this Contract purchased using the Town of Swampscott's Tax Exempt Number.

1.6 CONTRACT TIME

A. Contract Time: **Time is of the essence in this Contract. Work shall begin upon issuance of the Notice to Proceed and shall be Substantially Completed within the time periods indicated in the Contract Documents. See Section No. 01 10 00 – Summary of Work for Phasing and Substantial Completion Dates. See Item 1.14.C below for Liquidated**

Damages that will apply for missing Substantial Completion dates.

1.7 CONTRACT AWARD

A. Bid Opening: Bids will be opened in public and bidders may be present. Bid amounts will be read aloud, recorded, and referred to the Town of Swampscott for consideration.

B. Bid Disposition: The bids of the three lowest bids may not be withdrawn for 30 days (Saturdays, Sundays, and legal holidays excluded) after receipt of general bids.

C. Contract Award: The Contract will be awarded within six days after receipt of bids (Saturdays, Sundays, and legal holidays excluded) to the lowest responsible and eligible bidder, except in the event of substitution as provided under M.G.L. Chapter 149, Section 44E and 44F, in which cases the procedure as required by these sections of Law shall govern the award of the Contracts. No bid shall be considered accepted until the Town of Swampscott has issued written notice of award sent by mail or delivered to the address given by the successful bidder on its bid form.

D. Bids May Be Rejected: The Town of Swampscott reserves the right to waive informalities in any or all general bids; to reject any or all general bids; to revise the Contract Documents and rebid if it is in the public interest to do so.

E. Definition of "Lowest Responsible and Eligible Bidder": The "lowest responsible and eligible bidder" means the Bidder whose bid is the lowest of those bidders who has demonstrated they possess the skill, ability, and integrity necessary for faithful performance of the work, and who meet the requirements for the Bidders set forth in M.G.L. Chapter 149, Sections 44A-H, and who are not debarred from bidding under M.G.L. Chapter 149,Section 44C, and who certify that they are able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

1.8 DOCUMENT SUBMISSION CHECKLIST

A. Bid Required Submittals: On or before the date and time for receipt of bids, bidders must submit the following:

1. Form for Bid
2. Bid Deposit/Bid Bond
3. Certificate of Eligibility
4. DCAMM Update Statement
5. Schedule of Unit Prices
6. Bid Proposal Certification (General Bidders Only)

1.9 LOCAL FEES

A. Building Permit Fees: Contractor shall be required to obtain all necessary permits. The Town of Swampscott will waive all building and permit fees.

B. Inspection Fees: The Town of Swampscott will waive all inspection fees for building work.

1.10 PRICES

In the event there is a discrepancy between the price written in words and written in figures, the price written in words shall govern. After the bid opening, a bidder may not change any provisions of the bid in a manner prejudicial to the interests of the Town of Swampscott or fair competition. Minor informalities will be waived or the bidder will be allowed to correct them. If a mistake and the intended bid are clearly evident on the face of the bid document, the mistake will be corrected to reflect the intended correct bid, and the bidder will be notified in writing; the bidder may not

withdraw the bid. A bidder may withdraw a bid if a mistake is clearly evident on the face of the bid document, but the intended correct bid is not similarly evident.

1.11 INSURANCE REQUIREMENTS

Bidders must provide insurance coverage of the greater types, and in amounts equal to or greater than either those shown below, or those shown in Section 00 52 00 - Owner-Contractor Agreement:

.1 Workers' Compensation: Coverage A – Statutory: Coverage $500,000 per issuing Agreement

.2 Commercial General Liability

a.) Workers' Compensation

b.) Employer's Liability $1,000,000 Each Accident
$500,000 Disease, Each Employee
$500,000 Disease, Policy Limit

c.) Commercial General Liability Insurance: Written on an occurrence basis, with general aggregate limit applicable to this Project only:
Each Occurrence Bodily Injury and Broad Form Property Damage $1,000,000 per Occurrence
Medical Expenses $10,000
Personal and Adv. Injury $1,000,000 per Occurrence
General Aggregate $1,000,000
Products and Completed Operations Aggregate $3,000,000

d.) Automobile Liability (owned, non-owned, and hired vehicles):
Bodily Injury $1,000,000 per Person
$1,000,000 per Accident
Property Damage $1,000,000 per Accident
Combined Single Limit $1,000,000 per Accident

e.) Umbrella Insurance $2,000,000 each Occurrence
$2,000,000 Aggregate

f.) Additional Terms:
i) General Aggregate must apply solely to the Project;
ii) Products and Completed Operations coverage must continue for three years beyond the date of Final Payment by the Owner;
iii) The Owner shall be names as loss payee on all policies;
iv) The Contractor shall provide the Owner with thirty (30) days written notice of cancellation, non-renewal of coverage or material change of coverage;

.3 Environmental Coverage (contamination, etc.) $1,000,000 each Occurrence
$3,000,000 Aggregate

The Owner's Project Manager and Designer shall be named "Additional Insured" on these policies.

1.12 WORKER'S COMPENSATION REQUIREMENTS

Coverage for all employees in accordance with Massachusetts General Laws. All coverages, except Workers' Compensation, shall name the Town of Swampscott as an additional Insured, and shall provide for 30 days prior written notice to the District of any modification or termination of coverage. Failure to maintain the required insurance coverage throughout the term of the contract shall be considered a material breach of the contract.

1.13 WAGE RATES AND STATEMENT OF COMPLIANCE

A. Applicable Laws: All provisions of the Contract Documents shall be subject to all applicable

provisions of law, including, without limitations, 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 conflict between the contract documents and applicable statues, the provisions of law shall govern.

B. 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 scheduled is appended to this Project Manual 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 the Town of Swampscott by governmental authorities is appended to this section. The Architect and Town of Swampscott 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.

C. 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 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 Contact and shall operate as an immediate termination thereof.

D. Records: Every Contractor and subcontractor working under the terms of any contract for the construction on this project shall file weekly payroll records with the Town of Swampscott in the form described in M.G.L Chapter 149, Section 26 and 27B and as amended by Section 174 Chapter 110 of the acts of 1993.

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 Town of Swampscott associated with a stop work order for prevailing wage violation will be borne solely by the Contractor.

1.14 COMMENCEMENT OF THE WORK AND SUBSTANTIAL COMPLETION

A. The selected bidder must agree to commence work on the issuance of a written Notice to Proceed and must adhere to the project's Substantial Completion date as outlined in Section No. 01 10 00 – Summary of Work.

C. In the case all work is not completed by the date as specified in the contract documents, it shall be understood and agreed that the contractor shall pay the owner liquidated damages as set forth below in order to compensate the Town of Swampscott for interference with educational goals,

additional cleaning costs, and provisions for overall safety measures.

1. A sum of $2,000.00 for each calendar day after substantial completion date.

1.15 CRIMINAL OFFENDER RECORD INFORMATION

A. As required by Massachusetts General Law M.G.L c. 71 Section 38R, the Town of Swampscott will obtain criminal offender record information on any/all employees of the selected contractor who may be working on school premises at either or both schools under this contract. The contractor shall require all of its employees to complete a Town of Swampscott CORI request form. These forms must be submitted by a representative of the contractor to the Town of Swampscott for processing. No employee of the contractor or subcontractor(s) will be permitted on the work site at either school until the CORI background checks have been completed processed and the individual has been cleared to work. The Town of Swampscott will notify the representative of the contractor as employees are cleared to work on site.

END OF SECTION

SECTION 00 41 00

GENERAL BID FORM

Date: _____, 2016

Bidder: _____

To: The Town of Swampscott, MA

A. The Undersigned proposes to furnish all labor and materials required for the Boiler replacement at the Hadley Elementary School, Swampscott,,MA in accordance with the accompanying plans and specifications prepared by Raymond Design Associates, Inc. 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.1 **The proposed Base Bid for the Boiler Replacement at the Hadley Elementary School is:**

_____dollars.

($_____)

Alternate No 1: BacNet Internet Interface & Access to Boiler Controls.

Add_____dollars

($_____)

<u>NOTE</u>: Contract Award will be made based upon the Base Bid, as written in Item C.1 above, including Alternate if chosen by the Town of Swampscott.

D. The subdivision of the proposed Contract Price Base Bid is as follows:

Item #1: The work of the General Contractor, being all work other than that covered by Item #2a and #2b below.

_____

_____ ___ Dollars ($_____)

Item #2a: Sub-Bids as follows: N/A

E. **NOTE: DOUMENTS TO BE INCLUDED WITH THIS BID**

1. **Section 01 41 18 Unit Prices MUST be completed and included with this Bid Form.**
2. **Section 00 41 20 Prime / General DCAMM Update Statement to be completed and included with this Bid Form**.
3. **Section 00 43 13 Bid Bond to be completed and included with this Bid Form**.
4. **Section 00 45 13 Bid Proposal Certification to be completed and included with this Bid Form**.

F. 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.

G. The undersigned agrees that, if he/she is selected as general contractor he/she 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, including alternates, the premiums for which are to be paid by the general contractor and are included in the contract price.

The undersigned hereby certifies that he/she 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/she 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)

_____
(Signature)

SPECIAL NOTICE TO AWARDING AUTHORITY
BIDDERS' UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)

EFFECTIVE MARCH 30, 2010

Commonwealth of Massachusetts
Division of Capital Asset Management
PRIME/GENERAL CONTRACTOR UPDATE STATEMENT

TO ALL BIDDERS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED PRIME/GENERAL CONTRACTOR UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY PRIME/GENERAL BID FOR A CONTRACT PURSUANT TO M.G.L. c.149, §44A AND M.G.L. c. 149A. ANY PRIME/GENERAL BID SUBMITTED WITHOUT AN APPROPRIATE UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Prime/General Contract bids. It is not to be used for submitting Filed Sub-Bids or Trade Sub-Bids.

AWARDING AUTHORITIES

If the Awarding Authority determines that the bidder does not demonstrably possess the skill, ability, and integrity necessary to perform the work on the project, it must reject the bid.

BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Prime/General Contractor Update Statement on behalf of the bidder named below, that I have read this Prime/General Contractor Update Statement, and that all of the information provided by the bidder in this Prime/General Contractor Update Statement is true, accurate, and complete as of the bid date.

Bid Date	Print Name of Prime/General Contractor
Project Number (or name if no number)	Business Address
Awarding Authority	Telephone Number

SIGNATURE⇨ _____

Bidder's Authorized Representative

INSTRUCTIONS

INSTRUCTIONS TO BIDDERS

- This form must be completed and submitted by all Prime/General contractors bidding on projects pursuant to M.G.L. c. 149, §44A and M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- **This Update Statement must include all requested information that was not previously reported on the Application used for your firm's most recently issued (not extended or amended) Prime/General Contractor Certificate of Eligibility. The Update Statement must cover the entire period since the date of your Application, NOT since the date of your Certification.**
- You must use this official form of Update Statement. Copies of this form may be obtained from the awarding authority and from the Asset Management Web Site: www.mass.gov/dcam .
- If additional space is needed, please copy the appropriate page of this Update Statement and attach it as an additional sheet.
- See the section entitled "Bidding Limits" in the *Instructions to Awarding Authorities* for important information concerning your bidding limits.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Bidder Qualifications

- It is the awarding authority's responsibility to determine who is the lowest eligible and responsible bidder. You must consider all of the information in the low bidder's Update Statement in making this determination. Remember: this information was not available to the Division of Capital Asset Management at the time of certification.
- The bidder's performance on the projects listed in Parts 1 and 2 must be part of your review. Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE LOW BIDDER'S ENTIRE CERTIFICATION FILE AT THE DIVISION OF CAPITAL ASSET MANAGEMENT. Telephone (617) 727-9320 for an appointment.

Bidding Limits

Single Project Limit: The total amount of the bid, including all alternates, may not exceed the bidder's Single Project Limit.

Aggregate Work Limit: The annual value of the work to be performed on the contract for which the bid is submitted, when added to the annual cost to complete the bidder's other currently held contracts, may not exceed the bidder's Aggregate Work Limit. Use the following procedure to determine whether the low bidder is within its Aggregate Work Limit:

Step 1 Review Update Statement Question #2 to make sure that all requested information is provided and that the bidder has accurately calculated and totaled the annualized value of all incomplete work on its currently held contracts (column 9).

Step 2 Determine the annual dollar value of the work to be performed on your project. This is done as follows:

(i) If the project is to be completed in less than 12 months, the annual dollar value of the work is equal to the full amount of the bid.

(ii) If the project will take more than 12 months to complete, calculate the number of years given to complete the project by dividing the total number of months in the project schedule by 12 (calculate to 3 decimal places), then divide the amount of the bid by the calculated number of years to find the annual dollar value of the work.

Step 3 Add the annualized value of all of the bidder's incomplete contract work (the total of column 9 on page 5) to the annual dollar value of the work to be performed on your project. **The total may not exceed the bidder's Aggregate Work Limit**.

Correction of Errors and Omissions in Update Statements

Matters of Form: An awarding authority shall not reject a contractor's bid because there are mistakes or omissions of form in the Update Statement submitted with the bid, provided the contractor promptly corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.05(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a contractor notice of defects, other than mistakes or omissions of form, in the contractor's Update Statement, and an opportunity to correct such defects, provided the correction of such defects is not prejudicial to fair competition. An awarding authority may reject a corrected Update Statement if it contains unfavorable information about the contractor that was omitted from the Update Statement filed with the contractor's bid. [810 CMR 8.05(2)].

PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE *BUILDING* PROJECTS YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) DCAM CERTIFICATE OF ELIGIBILITY. YOU MUST REPORT ALL REQUESTED INFORMATION NOT PREVIOUSLY REPORTED ON THAT DCAM APPLICATION*.

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Update Statement.

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. _______

PART 2 - CURRENTLY HELD CONTRACTS

LIST ALL PUBLIC AND PRIVATE BUILDING AND NON-BUILDING *CONSTRUCTION* PROJECTS YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

1	2	3	4	5	6	7	8	9
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)	NO. OF YEARS REMAINING (see note below)	ANNUALIZED VALUE OF INCOMPLETE WORK (col. 7 ÷ col. 8) (divided by)

ANNUALIZED VALUE OF ALL INCOMPLETE CONTRACT WORK (Total of Column 9) $_____

Column 8
- If less than one year is left in the project schedule, write 1.
- If more than 12 months are left in the project schedule, divide the number of months left in the project schedule by 12 (calculate to three decimal places).

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone
	OWNER: Owner DESIGNER: Designer GC: GC	Contact Person Contact Person Contact Person	Telephone Telephone Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? ☐ YES ☐ NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? ☐ YES ☐ NO

If you have answered YES to either question, explain. ______

PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?	☐	☐
2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	☐	☐
3. Has your firm failed or refused to complete any punch list work under any contract?	☐	☐
4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?	☐	☐
5. Has your surety taken over or been asked to complete any of your work under any contract?	☐	☐
6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?	☐	☐
7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	☐	☐
8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?	☐	☐
9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	☐	☐
10. Have there been any deaths of an employee or others occurring in connection with any of your projects?	☐	☐
11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder's firm, which were instituted or concluded (adversely or otherwise) since your firm's Application for your most recently issued (not extended or amended) Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility.

The term "administrative proceeding" as used in this Prime/General Contractor Update Statement includes (i) any action taken or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code, legal, or contractual requirement, except for those brought in state or federal courts, or (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal or contractual requirement.

The term "anyone with a financial interest in your firm" as used in this Section "I", shall mean any person and/or entity with a 5% or greater ownership interest in the applicant's firm.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding or action and any judgment, decision, fine or other sanction or result. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgment or decision was entered, fines or penalties imposed, etc.).

		YES	NO
1.	Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?	☐	☐
2.	Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?	☐	☐
3.	Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state's or federal procurement laws arising out of the submission of bids or proposals?	☐	☐
4.	Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?	☐	☐

PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

	YES	NO
5. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker's compensation?	☐	☐
6. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?	☐	☐
7. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?	☐	☐
8. Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?	☐	☐
9. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of state or federal law regulating the environment?	☐	☐
10. Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA's Web Site at www.osha.gov	☐	☐
11. Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?	☐	☐
12. Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?	☐	☐
13. Are there any other issues that you are aware which may affect your firm's responsibility and integrity as a building contractor?	☐	☐

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel, such as project managers and superintendents, who will be assigned to the project if your firm is awarded the contract. **Attach the resume of each person listed below**.

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm's business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? ☐ Yes ☐ No
If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT.

Attach here a copy of the list of completed construction projects which was submitted with your firm's DCAM Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. The Attachment must include a complete copy of the entire Section G – "Completed Projects" and the final page – "Certification" (Section J) containing the signature and date that the Completed Projects list (Section G) was submitted to the Division of Capital Asset Management.

DRAFT

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

« »« »
« »

BOND AMOUNT: $ « »

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

«Boiler Replacement @ Hadley Elementary School»
«24 Redington Street
Swampscott, MA 01907»
« »

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

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

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

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

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

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

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User Notes: (1901285492)

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

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

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User Notes: (1901285492)

INVITATION FOR BIDS
2017-01
BOILER REPLACEMENT AT HADLEY ELEMENTARY SCHOOL
REQUIRED CERTIFICATIONS

1. NON-COLLUSION:

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

2. TAX COMPLIANCE:

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

3. CORPORATE BIDDER (*if applicable*):

I,_____certify that I am the_____of the corporation named as Bidder in the Bid included herein, that_____, who signed said Bid on behalf of the Bidder was then_____of said corporation, that I know his signature, that his signature thereon is genuine and that said Bid was duly signed, sealed and executed for and in behalf of said corporation by authority of its governing body.

(Corporate Seal)

_____
(Secretary-Clerk)

4. PREVAILING WAGES:

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

to be based upon the payment of the said applicable prevailing wage rates, or (2) the failure of the bidder or quoter, if selected as the Contractor, to pay laborers employed on the project the said applicable prevailing wages.

5. DEBARRMENT

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.

6. LABOR HARMONY AND OSHA TRAINING

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.

_____
(Signature of authorized individual submitting proposal)

_____
(Printed Name)

_____
(Name of Bidder (if different than name))

_____
(Federal Tax Identification or Social Security Number)

_____
(Date)

INVITATION FOR BIDS
BOILER REPLACEMENT AT HADLEY ELEMENTARY SCHOOL
SAMPLE AGREEMENT

CONTRACT NO. 2017-01

TOWN OF SWAMPSCOTT
School Department
Boiler Replacement at Hadley Elementary School

This agreement is made and entered into by and between the Town of Swampscott, MA (hereinafter the TOWN), a municipal corporation organized and existing under the laws of the Commonwealth of _____ (hereinafter the CONTRACTOR).

ARTICLE 1. DEFINITION.

This CONTRACT as used herein shall mean these articles, and the "contract documents" which include but are not limited to the following identified items and all documents, and forms submitted therewith, or attached hereby.

- ❑ Attachment A: Scope of Services, and/or other bid package materials
- ❑ Attachment B: Additional Contract Terms and Conditions
- ❑ Attachment C: Statement of Corporate Authority
- ❑ Addenda:

ARTICLE II. AMOUNT AND DURATION.

The TOWN shall pay the CONTRACTOR in accordance with the rates listed in CONTRACTOR'S bid 15-16. The work hall commence upon issuance of the 'Notice to Proceed' and be substantially complete _____.

ARTICLE III. PERFORMANCE.

The CONTRACTOR agrees to provide all goods and services set forth in the Invitation for Bid 15-16 for Bid Documents, Scope of Service, the Contractor's "Bid # 15-16" and/or as outlined in ATTACHMENT A - SCOPE OF SERVICES.

ARTICLE IV. TERMINATION.

i) Without Cause. The TOWN may terminate this CONTRACT on sixty (60) calendar days notice, or may suspend this CONTRACT for up to sixty (60) calendar days upon receipt of notice, when in the best interests of the TOWN by providing notice to the CONTRACTOR, which shall be in writing and shall be deemed delivered and received when given in person to the CONTRACTOR, or when received by fax, express mail, certified mail return receipt

requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the CONTRACTOR.

ii) For Cause. If the CONTRACTOR is determined by the TOWN to be in default of any term or condition of CONTRACT, the TOWN may terminate this contract on thirty (30) days notice by providing notice to the CONTRACTOR, which shall be in writing and shall be deemed delivered and received when given in person to the CONTRACTOR, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the CONTRACTOR. If the TOWN is determined by the CONTRACTOR to be in default of any term or condition of this CONTRACT the CONTRACTOR may terminate this contract on thirty (30) days notice by providing notice to the TOWN, which shall be in writing and shall be deemed delivered and received when given in person to the TOWN, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the TOWN.

iii) Default. The following shall constitute events of default under this CONTRACT: a) any material misrepresentation made by the CONTRACTOR to the TOWN, b) any failure to perform any of its obligations under this CONTRACT including, but not limited to the following: (i) failure to commence performance of this CONTRACT at the time specified in this CONTRACT due to a reason or circumstance within the CONTRACTOR'S reasonable control,
(ii) failure to perform this CONTRACT with sufficient personnel and equipment or with sufficient material to ensure the completion of this CONTRACT within the specified time due to a reason or circumstance within the CONTRACTOR'S reasonable control, (iii) failure to performance this CONTRACT in a manner reasonably satisfactory to the TOWN, (iv) failure to promptly re-perform with reasonable time the services that were rejected by the TOWN as unsatisfactory, or erroneous, (v) discontinuance of the services for reasons not beyond the CONTRACTOR'S reasonable control, (vi) failure to comply with a material term of this CONTRACT, including, but not limited to, the provision of insurance and nondiscrimination, and (vii) any other acts specifically and expressly stated in this CONTRACT as constituting a basis for termination of this CONTRACT, and (viii) failure to comply with any and all requirements of state law, and/or regulations, and City ordinances, and/or regulations.

ARTICLE V. REMEDIES OF THE TOWN.

The TOWN may deduct the cost of any substitute contract or performance for expenses, losses, and all damages, including incidental and consequential damages as a result of any event of non-conformance or non-performance of the CONTRACTOR in complying with the terms of this CONTRACT, and shall withhold such expenses, losses, and damages from sums due, or to become due.

ARTICLE VI. REMEDIES OF THE CONTRACTOR.

If the damages, other than loss, non-conformance, or non-performance, are actually sustained by the CONTRACTOR due to any act or omission for which the TOWN is legally responsible the TOWN shall allow a sum equal to the amount of such damages sustained by the Contractor as determined by the TOWN in writing, provided the Contractor shall have provided to all signatories of the contract a detailed written statement of such damages and cause thereof within 30 days of the act of omission by the TOWN.

ARTICLE VII. ASSIGNABILITY.

The CONTRACTOR shall not assign, subcontract or in any way transfer any interest in this contract without the prior written consent of the Procurement Officer of said TOWN. In the event of such occurrence the TOWN reserves the right to deal with any assignee subcontractor or transferee directly and the contractor agrees to remain bound by all terms and conditions of this contract in accordance with its original tenor. The provisions of this CONTRACT shall be binding upon, and shall inure to the benefit of, the successors and assigns of the CONTRACTOR and any public body or bodies succeeding the interests of the TOWN.

ARTICLE VIII. INDEMNIFICATION.

The CONTRACTOR shall assume the defense, indemnify and hold harmless the TOWN, the TOWN'S agents and employees, from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against them by reason of acts, in actions, omissions, negligence, reckless or intentional misconduct of the said CONTRACTOR, its agent(s), officers, employees, or subcontractors; in the execution of the work or in guarding the same. Unless otherwise provided by law, the TOWN may elect to indemnify the CONTRACTOR for claims arising in tort if it is determined that the CONTRACTOR performed its obligations under this CONTRACT pursuant to the direct supervision and control of the TOWN or its designated agent(s).

ARTICLE IX. WORKER'S COMPENSATION AND OTHER INSURANCE.

The CONTRACTOR shall provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws of Massachusetts (The Worker's Compensation Act) to all employees of the CONTRACTOR who are subject to the provisions of Chapter 152 of the General Laws of Massachusetts.

Failure to provide and continue in force such insurance during the period of this contract shall be deemed a material breach of this contract, shall operate as an immediate termination thereof, and CONTRACTOR shall indemnify the TOWN for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

The Contractor shall furnish to the TOWN evidence of such insurance prior to the execution of this contract and before the same shall be binding on the parties thereto, except if specifically waived in Attachment B.

Prior to commencement of any work and until completion of its work under this CONTRACT shall maintain the following insurance coverage, at its cost, from insurance acceptable to the TOWN, giving evidence of such coverage to the TOWN prior to execution of this CONTRACT, a copy of such insurance coverage to be attached herewith:

Insurance Coverage:

General - The Successful Bidder shall before commencing performance of the Contract be responsible for providing and maintaining insurance coverage in force for the life of the Contract of the kind and in adequate amounts to secure all of the obligations under the Contract and with insurance companies licensed to write insurance in the Commonwealth of Massachusetts. All such insurance carried shall not be less than the kinds and amounts designated herein, and the Successful Bidder agrees that the stipulation herein of the kinds and limits of coverage shall in no way limit the liability of the Successful Bidder to any such kinds and amounts of insurance coverage. All policies issued shall indemnify and

save harmless the Town of Swampscott, its agents and employees from any and all claims for damages to persons or property as may arise out of the performance of this Contract.

Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of this Contract, and may constitute sufficient grounds for immediate termination of the same. All insurance maintained as provided for in the above shall be taken out and maintained at the sole expense of the Successful Bidder. Proof of such insurance shall be delivered to the Purchasing Agent within Five (5) days from the date of the Notice of Intent to Award.

No cancellations of such insurance, whether by the insurer or by the insured party shall be valid unless written notice thereof is given by the parties proposing cancellation to the other party and to the Town of Swampscott at least fifteen- (15) days prior to the intended effective date thereof, which date shall be expressed in said notice, which shall be sent by registered mail, return receipt requested. These provisions shall apply to the legal representatives, trustee in bankruptcy, receiver, assignee, trustee, and the successor in interest of the Successful Bidder.

All required insurance must be endorsed to name the TOWN as Additional Insured. All required insurance shall be endorsed to waive the insurer's rights of subrogation against the TOWN. All policies and certificate for insurance must contain language that the insurance shall not be canceled, materially changed or non-renewed without at least thirty (30) days advance written notice to the TOWN. The CONTRACTOR under this CONTRACT shall not allow it subcontractors to begin work until similar insurance has been so obtained and certificates of insurance approved by the CONTRACTOR.

All insurance coverage shall be placed with such company as may be acceptable to the Town of Swampscott and shall constitute a material part of the Contract documents.

Successful Bidder's Comprehensive Public Liability Insurance including Contractor's Protective, Completed Operations and Contractual Liability - The Successful Bidder shall carry Comprehensive Public Liability Insurance including Contractor's Protective, Completed Operations and Contractual Liability in the amount of not less than:

Bodily Injury limit of not less than One Million Dollars ($1,000,000.00) each occurrence and Two Million Dollars ($2,000,000.00) aggregate.

Property Damage Including C.U. Coverage limit of not less than 2 Million Dollars ($2,000,000.00) each occurrence and Two Million Dollars ($2,000,000.00) aggregate.

Blasting and explosion coverage shall be obtained if there is a need for blasting under the contract.

Successful Bidder's Personal Injury Insurance - The Successful Bidder shall carry Personal Injury Insurance in the amount of not less than:

Limit of not less than Two Million Dollars ($2,000,000.00) aggregate.

Successful Bidder's Owner's Protective Liability & Property Damage - The Successful Bidder shall carry Owner's Protective Liability & Property Damage Insurance in the amount of not less than:

Bodily Injury limit of not less than One Million Dollars ($1,000,000.00) each occurrence and One Million Dollars ($1,000,000.00) aggregate.

Property Damage limit of not less than One Million Dollars ($1,000,000.00) each occurrence.

Workers Compensation and Employer's Liability Insurance - The Successful Bidder shall carry Workman's Compensation and Employer's Liability Insurance as required by the Commonwealth of Massachusetts and prescribed under Massachusetts Law.

Comprehensive Automotive Liability including coverage for owned, hired, or borrowed vehicles-

The Successful Bidder shall carry comprehensive Automobile Liability Insurance covering all owned vehicles, hired vehicles or non-owned vehicles under the control of the Successful Bidder while performing work under this Contract in the amount of not less than:

Bodily Injury limit of not less than One Million Dollars ($1,000,000.00) each person and One Million Dollars ($1,000,000.00) occurrence.

Property Damage limit of not less than One Million Dollars ($1,000,000.00) each occurrence.

ARTICLE X. CORPORATE CONTRACTOR.

If CONTRACTOR is a corporation, CONTRACTOR shall endorse the Certificate of Corporate Authority for the CONTRACTORS' signatory (Attachment C), or shall otherwise provide a form similar in nature and substance acceptable to the TOWN.

If CONTRACTOR is a non-profit corporation, CONTRACTOR shall provide satisfactory proof of present status as a non-profit corporation. Such proof shall be in the form of a certification from the Massachusetts Secretary of State's office and/or from the Internal Revenue Service and shall provide the Federal Tax Identification Number of the non-profit corporation. This agreement shall not be enforceable against the TOWN unless and until the CONTRACTOR complies with this section. Failure to inform the TOWN in writing of revocation, or other loss of non-profit status shall be deemed a material breach of this contract and operate as an immediate termination thereof.

ARTICLE XI. SUBJECT TO APPROPRIATION.

The obligations of the TOWN under this CONTRACT shall be subject to appropriation. In the absence of appropriation this CONTRACT shall be immediately terminated without liability for damages, penalties, or other charges.

In the requisite circumstances, the obligations of the TOWN under this CONTRACT shall be subject to the formal award of the state, federal grant.

ARTICLE XII. DOCUMENTS, MATERIALS, ETC.

Any materials, reports, information, data, etc. given to or prepared or assembled by the CONTRACTOR under this CONTRACT are to be kept confidential and shall not be made available to any individual or organization by the CONTRACTOR (except agents, servants, or employees of the CONTRACTOR) without the prior written approval of the CITY, except as otherwise required by law. The CONTRATOR understands that he/she/it may acquire or have access to "personal data" otherwise kept by the TOWN. The CONTRACTOR shall comply with the provisions Chapter 66A of the General Laws of Massachusetts as it relates to public documents, and all other state and federal laws and regulations relating to confidentiality, security privacy and use of confidential data.

Any materials produced in whole or in part under this CONTRACT shall not be subject to copyright, except by the TOWN, in the United States or any other country. The TOWN shall have unrestricted authority to, without payment of any royalty, commission, or additional fee of any type or nature, publicly disclose, reproduce, distribute and otherwise use, and authorize other to use, in whole or in part, any reports, data or other materials prepared under this CONTRACT.

All data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for by the TOWN shall vest in the TOWN at the termination of this CONTRACT. The CONTRACTOR shall at all times, during or after termination of this CONTRACT, obtain the prior written approval of the TOWN before making any statement bearing on the work performed or data collected under this CONTRACT to the press or issues any material for publication through any medium.

ARTICLE XIII. AUDIT, INSPECTION, RECORDKEEPING.

At any time during normal business hours, and as often as the TOWN may deem it reasonably necessary, there shall be made available in the office of the CONTRACTOR for the purpose of audit, examination, and/or to make excerpts or transcripts, all records, contracts, invoices, materials, payrolls, records of personnel, conditions of employment and other data relating to all matters covered by this agreement.

Further the CONTRACTOR agrees to make its work papers, records and other evidence of audit available to the TOWN for a period of three years after final payment under his CONTRACT. The TOWN shall be entitled to reproduce any or all such documents at its own expense, for which provision shall be made at such time.

ARTICLE XIV. WEEKLY PAYROLL RECORDS REPORT.

In accordance with Massachusetts General Law c. 149, s. 27B, a true and accurate record must be kept of all individuals employed on a public works construction project for which prevailing wage rates are applicable.

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

ARTICLE XV. CONFLICT OF INTEREST.

i) TOWN. No officer, member or employee of the TOWN and no members of its governing body who exercise any function or responsibility in review or approval of the undertaking or carrying out of this CONTRACT shall participate in any decision relating to the CONTRACT which affects his/her personal interests or the interest of any corporation, partnership, or association in which he/she has a direct or indirect pecuniary interest. None of the services to be provided by the CONTRACTOR shall be used for any partisan political activity or further the election or defeat of any candidate for political office in the TOWN. Compliance with this section shall be material to the CONTRACT.

ii) CONTRACTOR. CONTRACTOR agrees that his/her/its agents, servants, and employees have neither presently nor during the period of this CONTRACT any interest direct or indirect which would impair, detract, or conflict in any manner or degree with the performance of services required under this CONTRACT. The CONTRACTOR, his/her/its agents, servants or employees further stipulates that in the performance of this CONTRACT, no person having any such interest shall be employed. Conflicts of Interest include but are not limited to (a) immediate family relationships with officials of the TOWN, (b) instances where the CONTRACTOR, his/her/it agents, servants or employees during the period of this CONTRACT was connected as an officer, employee or member of the governing body of the TOWN, and (c) instances where the CONTRACTOR has an interest in any TOWN department, its agents, servants or employees

or parcels of land within the TOWN. Compliance with this section shall be material to the CONTRACT.

ARTICLE XVI. PAYMENT.

The TOWN agrees to make all reasonable efforts to pay to the CONTRACTOR the sum set forth in the CONTRACTOR'S bid or proposal within thirty (30) days of receipt of an invoice at the Office of the City Auditor detailing the work completed.Subject to pending statutory appeal rights, CONTRACTOR agrees that all sums otherwise due and payable to the TOWN for outstanding taxes, fines, fees and or other municipal charges may be deducted from the sum(s) otherwise payable under this CONTRACT prior to disbursement to the CONTRACTOR.

ARTICLE XVII. CONFLICT.

In the event there is a conflict between these Articles and Attachment A, Attachment A shall supersede these Articles.

ARTICLE XVIII. WAIVER AND AMENDMENT.

The provisions contained in this CONTRACT may be modified only as specifically provided by ATTACHMENT B - ADDITIONAL TERMS AND CONDITIONS. Amendments, or waivers of any additional term, condition, covenant, duty or obligation contained in this CONTRACT may be made only by written amendment executed by all signatories to the original agreement, prior to the effective date of the amendment.

To the extent allowed by law, all conditions, duties, and obligations contained in this CONTRACT may be waived only by written agreement by both parties.

Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any manner limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach of a similar or different matter.

ARTICLE XIX. CERTIFICATION.

IN WITNESS WHEREOF, THE CONTRACTOR CERTIFIES, UNDER THE PAINS AND PENALTIES OF PERJURY, THAT THE CONTRACTOR IS IN COMPLIANCE WITH EACH OF THE FOLLOWING:

a. TAXES. PURSUANT to M.G.L. c. 62C, s. 49A, the CONTRACTOR has filed all state tax returns and complied with all laws of the Commonwealth relating to taxes.

b. DEBARMENT. The CONTRACTOR is not currently debarred or suspended by the Commonwealth of Massachusetts, or any of its entities or subdivisions.

c. AMERICANS WITH DISABILITIES ACT. The CONTRACTOR is aware of the recently enacted Americans with Disabilities Act which prohibits discrimination based upon disability and shall meet any relevant standards, and/or conditions set out in the bid/proposal documents, bid/proposal specifications, and/or ATTACHMENT A - SCOPE OF SERVICES.

ARTICLE XX. FORUM AND CHOICE OF LAW

This CONTRACT and any performance herein shall be governed by and be construed in accordance with the laws of Commonwealth. Any and all proceedings or actions relating to subject matter herein shall be

brought and maintained in the courts of the Commonwealth or the federal district court sitting in the Commonwealth, which shall have exclusive jurisdiction thereof. This paragraph shall not be construed to limit any other legal rights of the parties.

IN WITNESS WHEREOF the parties have hereto and to three other identical instruments set forth their hands the day and year first above written.

THE TOWN:

_____
Thomas Younger,
Town Administrator

_____
Whitney Haskell,
Designated Purchasing Agent

Approved as to form:

_____
Elizabeth Rennard, Esq.,
Designated City Solicitor

Approved as Contract Manager:

_____
Pamela Angelakis,
Superintendent of Schools

I certify that funds have been
encumbered in the amount of : $

_____
Dave Castellarin,
Town Accountant

THE CONTRACTOR:

_____
Authorized Signature

_____
Print Name

_____
Print Title

_____
Company

_____
Status (Corporate/Non- Corporate)

_____
Taxpayer Identification Number

_____
Date

ATTACHMENT A

INSTRUCTIONS FOR DEPARTMENT AND CONTRACTOR: *Please attach for reference purposes a copy of all bid/proposal documents, including but not limited to (i) invitations/instructions for bidders (ii) invitation/instructions for proposers, (iii) general and specific conditions, and please provide a detailed description of all types of goods and/or services that will be provided pursuant to this CONTRACT, not otherwise provided in any bid/proposal instructions, specifications, conditions or other documents.*

Please refer to the scope of services found in Invitation for Bids 15-16 "Hadley Elementary School Boiler Replacement" incorporated here by reference.

ATTACHMENT B

ADDITIONAL CONTRACT TERMS AND CONDITIONS

INSTRUCTIONS FOR DEPARTMENTS: *Please specify any additions or modifications to the terms and conditions (not to conflict with the public procurement laws or City ordinances or regulations):*

N/A

ATTACHMENT C

CERTIFICATE OF CORPORATE AUTHORITY

If the Contractor is a corporation, complete the following certification:

At a duly authorized meeting of the Board of Directors of the _____ (Name of the Corporation) held on _____ (Date), at which all the Directors were present or waived notice, it was voted that, _____ (Name),_____(Officer) of this company, is authorized to execute Contracts and bonds in the name and behalf of said company, and affix its corporate seal thereto, and such execution of any Contract or obligation in this company's name on its behalf by such_____(Officer) of the company, shall be valid and binding upon this company.

I hereby certify that I am the Clerk of the _____ _____ (Name of the Corporation), that _____ _____ (Name) is the duly elected _____ (Officer) of said company, and that the above vote has not been amended or rescinded and remains in full force and effect as of the date of the Contract.

A true copy,

Attest:_____
(Clerk)

Place of Business: _____

Corporate Seal:

SECTION 00 63 13

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that_____, a _____ corporation duly established by law and having a usual place of business at_____,_____,_____as PRINCIPAL, and_____, a corporation under the laws of the State of _____ and duly authorized and admitted, under the provisions of Chapter 175 of the Massachusetts General Laws as amended, to transact the business of a Fidelity and Surety Company in Massachusetts, having a usual place of business at_____, _____,_____, as SURETY, are held and firmly bound unto the Town of Swampscott, a public school district within the Commonwealth of Massachusetts, having an address of 24 Redington Street, Swampscott, MA 01060, as OBLIGEE, in the sum of_____Dollars ($_____) in lawful money of the United States of America, 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 assigned, jointly and severally, firmly by these presents.

WHEREAS, the said PRINCIPAL has entered into a Contract with OBLIGEE, bearing the date of_____, 2015, for the "Boiler Replacement at the Hadley Elementary School, 24 Redington Street, Swampscott, MA"

NOW, THEREFORE, the condition of this obligations is such that if the said PRINCIPAL and all Subcontractors under said Contract shall well and faithfully keep and perform all the terms and conditions of said Contract on its part to be kept and performed as therein stipulates, including guarantee and maintenance provisions therein, and shall pay for all materials furnished and for all labor performed in the execution of said Contract, and shall indemnify and hold harmless the OBLIGEE as therein stipulates, then this obligations shall be of no effect; otherwise it shall remain in full force and virtue.

And the said SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of said Contract, or to the work to be performed there under, or to the specifications accompanying the same, shall in any way effect its obligation on this bond; and it does hereby waive notice of any change, extension of time, alterations or additions to the terms of said Contract, or to the work, or to the specifications.

In the event that the Contract is abandoned by the PRINCIPAL, or is terminated by the OBLIGEE under the provisions of the Contract, said SURETY hereby further agrees that OBLIGEE, take such action as is necessary to complete said Contract.

IN TESTIMONY WHEREOF, the said Principal has hereunto cause its name and seal to be affixed, and the said SURETY has caused its name and seal to be hereunto affixed by a duly authorized officer thereof and this instrument to be executed and delivered in its name and behalf

by its attorney-in-fact, duly authorized by its by-laws and votes, powers of attorney, and letters of appointment annexed to this bond and may be introduced in evidence as if part hereof.

IN WITNESS WHEREOF we hereunto set our hands and seal this_____day of _____, 2015.

PRINCIPAL:

_____

By: _____
(Seal)

SURETY:

_____

By: _____
(Seal)

_____
Attorney-in-Fact

SECTION 00 63 16

PAYMENT BOND

PROJECT: Boiler Replacement at the Hadley Elementary School, 24 Redington Street, Swampscott, MA

PROJECT LOCATION: 24 Redington Street, Swampscott, MA

OWNER: Town of Swampscott
207 Forest Avenue, Swampscott, MA 01970

KNOW ALL PERSONS BY THESE PRESENTS:

That we, (CONTRACTOR'S NAME)_____

as Principal, and (SURETY COMPANY)_____

as Surety, are held and firmly bound unto the Owner, as Obligee, in the sum of:

_____ Dollars (CONTRACT SUM)
(words)

$_____
(figures)

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

Whereas, the said Principal has made a Contract with the Obligee, bearing the date of _____, 2015, for the completion of the Project.

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

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

_____ day of_____, 2015.

PRINCIPAL	SURETY
_____	_____
_____	_____
(Name and Seal)	(Attorney-in-Fact – Seal)
_____	
(Title)	
Attest: _____	Attest: _____

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
«Boiler Replacement @ Hadley Elementary School»
«24 Redington Street
Swampscott, MA 01907»

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

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

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

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(Topics and numbers in bold are section headings.)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

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but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

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§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled

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to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce

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other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

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Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

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§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

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§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

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§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

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§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be

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furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the

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Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a separate contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

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§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

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§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

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§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's

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risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

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§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

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§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

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ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

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§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

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.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

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§ 15.1.2 NOTICE OF CLAIMS
Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE
Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST
If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME
§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES
The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION
§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The

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party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

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SUPPLEMENTARY CONDITIONS

Amending the General Conditions of the Contract for Construction
AIA Document A201 (2007 edition)

I. SUPPLEMENTARY CONDITIONS

The following addendum supplements, modifies, deletes and/or adds to the General Conditions. Where any Article, Paragraph or subparagraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such Article, Paragraph, or Subparagraph shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any Article, Paragraph, or subparagraph in the General Conditions is amended, voided or superseded by any of the following paragraphs, the provisions of such Article, Paragraph or subparagraph not so amended, voided, or superseded shall remain in effect.

II. MODIFICATIONS TO VARIOUS ARTICLES OF THE AIA CONDITIONS

ARTICLE 1 GENERAL PROVISIONS

1.1.1 In the first sentence, delete "are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and" after "The Contract Documents".

Insert "between the Owner and Contractor (hereinafter the Agreement)" after "consist of the Agreement".

In the last sentence:

Delete "Unless specifically enumerated in the Agreement".

Delete "not" after "Contract Documents do".

Delete "other" after "sample forms,".

Delete "or" after "or proposal," and insert "and".

Delete "bidding requirements" after "relating to" and insert "those documents."

1.1.8 Delete "Claims" and insert "claims".

Delete "and certify termination of the Agreement under Section 14.2.2.".

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1.2.1 Add to the end of the sub-section:

All Work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others. Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of Work unless otherwise directed by written addendum to the Contract.

1.2.2 Add to the end of the sentence:

, except that the performance of filed sub-trade work shall comply with the provisions of chapter 149 of the General Laws of the Commonwealth of Massachusetts. The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the Work of the mechanical, electrical and other specialized trades, and to all of the Sections of the Specifications, and shall perform all Work reasonably inferable therefrom as being necessary to produce the indicated results.

1.2.4 Add the following new sub-sections 1.2.4 to 1.2.11 as follows:
-1.2.11

§ 1.2.4 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

§ 1.2.5 Where codes, standards, requirements and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated.

§ 1.2.6 Where no explicit quality or standards for materials or workmanship are established for Work, such Work is to be of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

§ 1.2.7 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

§ 1.2.8 The Mechanical, Electrical and Fire Protection Drawings are diagrammatic only, and are not intended to show the alignment, physical

locations or configurations of such Work. Such Work shall be installed without additional cost to the Owner to clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. Prior to beginning such Work, the Contractor shall prepare coordination drawings showing the exact alignment, physical location and configuration of the Mechanical, Electrical and Fire Protection installations and demonstrating to the Contractor's satisfaction that the installations will comply with the preceding sentence. A copy of the drawings shall be submitted to the Architect, and the Contractor shall revise and resubmit the drawings if so directed by the Architect.

§ 1.2.9 Exact locations of fixtures and outlets shall be obtained from the Architect as provided in subparagraph 3.2.5 before the Work is roughed in; Work installed without such information from the Architect shall be relocated at the Contractor's expense.

§ 1.2.10 Test boring or soil test information included with the Contract Documents or otherwise made available to the Contractor was obtained by the Owner for use by the Architects in the design of the Project or Work. The Owner does not hold out such information to the Contractor as a completely accurate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the Contractor on such information shall be allowed except as provided in subparagraph 3.7.4.

§ 1.2.11 Where the Work is to fit with existing conditions or work to be performed by others, the Contractor shall fully and completely join the Work with such conditions or work, unless otherwise specified. Owner provided drawings showing existing conditions or construction are based on available documents and are not guaranteed to show actual existing conditions.

1.5.1 Delete 1.5.1 and replace as follows:

§ 1.5.1 All Drawings, Specifications and copies thereof furnished by the Owner are and shall remain the Owner's property. They are to be used only with respect to this Project and are not to be used on any other project without the prior written consent of the Owner. With the exception of one contract set for each party to the Contract, such documents are to be returned or suitably accounted for to the Owner at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of any reserved rights.

ARTICLE 2 OWNER

2.1.2 Delete sub-section 2.1.2.

2.2.1 Delete the last three sentences.

2.2.3 In the first sentence insert "available" after "shall furnish".

Delete the last sentence and replace as follows:

The Owner makes no warranty as to the accuracy or completeness of such information, and the Contractor shall exercise proper precautions relating to the safe performance of the Work.

2.2.4 Delete the last sentence.

2.2.5 Add to the end of the sub-section as follows:

All additional copies will be furnished upon request at the cost of reproduction.

2.3 Delete from the last sentence ", except to the extent required by Section 6.1.3" and add as follows:

The Contractor shall resume the Work after such stoppage promptly upon written notice to do so from the Owner. The Contractor shall remain responsible for maintaining the progress of the Work and shall not be entitled to any increase in the Contract Sum or Contract Time. The Contractor shall be responsible for all costs incurred by the Owner attributable to such an order to stop the Work.

2.4 In the second sentence:

Delete "Change Order" and replace with "Construction Change Directive".

Insert "and Owner's Project Manager's" after "for the Architect's".

Delete the third sentence.

Add to the end of the section as follows:

The rights of the Owner hereunder are in addition to any other rights set forth in the Contract Documents or available at law or in equity.

ARTICLE 3 CONTRACTOR

3.2.1 Delete "generally" after "the site, become".

Add to the end of the sub-section as follows:

The Contractor shall not be entitled to any change in the Contract Time or Contract Sum on account of its failure, or that of any Subcontractor, to comply with the foregoing requirements.

3.2.2 Delete the beginning of the second sentence as follows:

These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however,

Delete the last sentence and replace as follows:

If the Contractor performs any construction activity that it knows or should know involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear responsibility for the costs of any required correction.

3.2.3 Delete "not" after "Contractor is".

Delete ", but" after "public authorities" and create new sentence beginning with "The Contractor shall promptly".

3.2.4 Delete "claims" after "the Contractor shall make" and insert "a claim".

Delete the last sentence.

3.2.5 Add new sub-section 3.2.5 as follows:

§ 3.2.5 Any claim by the Contractor or Subcontractors that, in submitting their respective bids, they did not include all items as shown in the Contract Documents will be given no consideration for an adjustment of any kind. If any item is specified in a Section which would not normally furnish this item it shall be the responsibility of the Contractor to coordinate the situation with the Subcontractor, and if the item under consideration is not to be provided by the Subcontractor it shall be the responsibility of the Contractor to provide the work in question, without any additional cost to the Owner.

3.3.1 Add to the end of the first sentence as follows:

which shall not be less than such state of skill and attention generally rendered by the contracting profession for projects similar to the Project in scope, difficulty and location. The Contractor shall adequately staff the Project to properly and thoroughly manage, schedule and supervise all construction activities.

Delete the last sentence.

3.3.2 Add the last sentence as follows:

This obligation shall also extend to the presence on the Site of suppliers of materials or equipment, their employees, contractors, and agents engaged in the Work.

3.4.3 Add to the end of the second sentence as follows:

, and the Contractor shall ensure that all workers to be employed on the Project have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) of at least 10 hours. The Contractor shall be responsible for maintaining all safety precautions at and around the Project site. On the Owner's request, the Contractor shall permanently remove from the Project site any employee of the Contractor or any Subcontractor who fails to comply with the requirements of the Contract Documents or whose presence or behavior is deemed by the Owner to be adverse to the success of the Project or the Owner's interests.

3.5 Add to the end of the first sentence as follows:

and, promptly after written notification of non-conformance, shall be repaired or replaced by the Contractor with Work conforming to such requirements.

Delete the second to last sentence.

3.5.2 Add new sub-sections 3.5.2 to 3.5.8 as follows:
-3.5.8

§ 3.5.2 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense.

This provision shall not require the Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.

§ 3.5.3 If the Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval and request approval of the deviation.
The Architect shall judge the design and appearance of proposed substitutes, an may refuse to approve any substitute which, in the Architect's opinion, would be out of character or otherwise inconsistent with the character or quality of design of the Project.

§ 3.5.4 In informing the Architect of deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable in accordance with the Contract Documents. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

§ 3.5.5 Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.

§ 3.5.6 The warranty provided in this paragraph 3.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

§ 3.5.7 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranty will be performed in accordance with its terms and conditions.

§3.5.8 The Contractor shall guarantee all Work for a period of one year after Date of Substantial Completion, or by the terms of any special guarantee required by the Contract Documents. The Contractor shall,

upon written notice from the Owner, promptly correct defective Work or Work not in accordance with the Contract Documents.

3.6.1 Add new sub-section 3.6.1 as follows:

§ 3.6.1 The project is exempt from the Massachusetts Sales Tax to the extent permitted by G.L. c.64H, §6(f). The exemption number will be provided by the Awarding Authority to the Contractor.

3.7.2 Add to the end of the sub-section as follows:

If any of the Work is required to be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed and shall comply with any instructions or corrections ordered by the public authority.

3.7.3 Delete "knowing it" after "performs Work" and replace with "it knows or should know".

3.7.4 Delete sub-section 3.7.4 and replace as follows:

§ 3.7.4 Concealed or Unknown Conditions. Claims for concealed or unknown conditions shall be governed by Chapter 30, Section 39N of the General Laws of the Commonwealth of Massachusetts, as amended.

3.7.5 Delete second and last sentences.

3.8 Delete section 3.8 in its entirety.

3.9.1 In the first sentence:

Insert ", in accordance with the Contract Documents," after "shall employ".

Insert "at all times" after "the Project site".

3.9.4 Add new sub-sections 3.9.4 and 3.9.5 as follows:
-3.9.5

§ 3.9.4 The Contractor shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of Work and the storage of materials.

§ 3.9.5 The Contractor shall arrange for and attend job meetings with the Architect and such other persons as the Architect may from time to time wish to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be served on such representatives.

3.10.1 In the first sentence delete "promptly" after "The Contractor" and replace with "within twenty (20) days".

In the second sentence, insert "or as requested by the Architect" after "conditions of the Work and Project".

Add to the end of the sub-section as follows:

The construction schedule shall be in such form and contain such information as the Architect and Owner require. The construction schedule shall be resource loaded for the Contractor and all subcontractors, with each resource identified by name, description, unit of measure, and calendar assignment. For each class of work included in the Contractor's schedule of values, the construction schedule shall show the percentage of completion to be obtained and the total dollar value of the work to be completed as of the first of each month until Substantial Completion. All calculations shall be on the basis of work in place, but not including the value of materials delivered but not in place.

3.10.3 Add to the end of the sub-section as follows:

The Contractor's compliance with the construction schedule is a material obligation of the Contract.

3.10.4 Add new sub-sections 3.10.4, 3.10.5, and 3.10.6 as follows:
-3.10.6

§ 3.10.4 The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The construction schedule shall be updated every month (or more frequently if requested by the Owner) to reflect actual conditions (such updates are sometimes referred to in these General Conditions as "progress reports"). In the event any progress report indicates delays in achievement of any milestone date set forth in such schedule, the Contractor shall propose in

written form an affirmative plan (the "Recovery Schedule") to correct the delay, including overtime and/or additional labor, if necessary, which Recovery Schedule shall indicate the date by which the progress of the Work will comply with the construction schedule, and shall be subject to the approval of the Owner and the Architect. In no event shall any progress report or Recovery Schedule constitute an adjustment in the construction schedule, Contract Time or any milestone date unless any such adjustment is agreed to by the Owner and authorized pursuant to a Change Order.

§ 3.10.5 In the event (i) that the performance of the Work, as of a milestone date, has not progressed or reached the level of completion required by the construction schedule, and (ii) the progress of the Work is not brought back into compliance with the construction schedule on the date proposed by the Recovery Schedule, or the Contractor otherwise fails to comply with the Recovery Schedule, the Owner shall have the right to order the Contractor to take corrective measures to expedite the progress of the Work, including, without limitation, (1) supplying additional manpower, equipment, and facilities, (2) working additional shifts or overtime, (3) working additional days, and (4) other similar measures (hereinafter referred to collectively as "Corrective Measures"). Such Corrective Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents.

§ 3.10.6 The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Corrective Measures required by the Owner under or pursuant to Section 3.10.5. The Owner may exercise the rights furnished the Owner under or pursuant to Section 3.10.5 as frequently as reasonably necessary to ensure that the Contractor's performance of the Work complies with the milestone dates set forth in the construction schedule.

3.12.6 Add to the end of the sub-section as follows:

By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals the Contractor thereby represents that the Contractor has determined and verified all dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, Samples, or similar submittals and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor. In reviewing Shop Drawings, Product Data, Samples, and similar submittals the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

3.12.10 Add to the end of the last sentence as follows:

, except as provided in Section 3.2.

3.12.11 Add new subsection 3.12.11 as follows:

§ 3.12.11 When professional certification of materials, systems or equipment is required by the Contract Documents, the Owner shall be entitled to rely upon such certifications, and neither the Owner nor the Architect shall be expected to make an independent examination with respect to the performance of such materials, systems or equipment.

3.13 Add to the end of the section as follows:

The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times with the Owner. The Contractor's right to entry and use thereof arises solely from the permission granted by the Owner under the Contract Documents. The Owner shall not be liable to the Contractor, the Subcontractors, their employees, or anyone else with respect to the conditions of the premises, except only for a condition caused directly and solely by the negligence of the Owner.

3.15.1 Add "site" to the end of the second sentence.

3.15.2 Add to the end of the sentence as follows:

, and may deduct all costs thereof from any payment due the Contractor.

3.16 Insert ", Owner's representatives" after "provide the Owner".

3.18.1 Delete the first sentence and replace as follows:

To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, including claims, damage, loss or expense attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including the Work, caused in whole or in part by the negligent or wrongful acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate,

abridge, or reduce other rights or obligations, including those of indemnity, which would otherwise exist as to a party or person described in this section.

ARTICLE 4 ARCHITECT

4.1.2 In the first sentence delete ", Contractor" after "consent of the Owner".

In the second sentence insert "of the Owner" after "Consent".

4.1.3 Delete sub-section 4.1.3.

4.2.3 In the first sentence delete "reasonably" after "will keep the Owner".

4.2.10 Delete sub-section 4.2.10.

4.2.11 Add to the end of the sub-section as follows:

The parties agree that the Architect's duties under this subparagraph shall be governed by Chapter 30, Section 39P of the General Laws of the Commonwealth of Massachusetts, as amended.

4.2.12 Delete the second sentence.

ARTICLE 5 SUBCONTRACTORS

5.2.1 Delete the last sentence.

5.2.2 In the second sentence insert "and legally permissible" after "has made reasonable".

5.2.3 Delete the last two sentences and replace as follows:

No increase in the Contract Sum or Contract Time shall be allowed for such change.

5.2.4 Add to the end of the sub-section as follows:

The applicable provisions of Chapter 149, Section 44F of the General Laws of the Commonwealth of Massachusetts shall apply to filed sub-bid subcontractors.

5.4.1 In sub-heading .1 delete "Section 14.2" and replace with "Article 14".

Add new sub-heading .3 as follows:

.3 The Owner may further assign the subcontract to a successor contractor or other entity.

Delete last sentence of sub-section.

5.4.2 Delete sub-sections 5.4.2 and 5.4.3.
-5.4.3

ARTICLE 6 CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

6.1.1 At the end of the first sentence delete "including those portions related to insurance and waiver of subrogation".

In the second sentence delete "Claim" after "shall make such" and replace with "claim".

6.1.4 Delete sub-section 6.1.4 and replace as follows:

§ 6.1.4 The Owner reserves the right to enter any part of the Project site at any time to inspect the Work or to perform other work with its own forces or separate contractors, or to address any emergency situation. Such access is not to be construed to mean partial occupancy by the Owner and no claim for increase in the Contract Time or Sum will be considered unless such Owner's contractors have delayed or damaged the Contractor's Work. The Contractor shall permit the Owner to place and install as much furniture, equipment and other material during the progress of the Work as is possible before completion of the various parts of the Work and agrees that such placing and installation of equipment shall not in any way evidence the completion or acceptance of the Work or any portion of it.

6.2.3 Delete the last sentence.

6.2.5 Delete sub-section 6.2.5.

ARTICLE 7 CHANGES IN THE WORK

7.2.3 Add new sub-section 7.2.3 as follows:

§ 7.2.3 Upon request of the Owner or the Architect, the Contractor shall without cost to the Owner submit to the Architect, in such form as the Architect may require, an accurate written estimate of the cost of any proposed extra Work or change. The estimate shall indicate the quantity and unit cost of each item of material, and the number of hours of work and hourly rate for each class of labor, as well as a description and the amounts of all other costs chargeable under the terms of this Article. Unit

labor costs for the installation of each item of material shall be shown if required by the Architect. The Contractor shall promptly revise and resubmit each estimate if the Architect determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors. If required by the Architect, in order to establish the exact cost of new Work added or of previously required Work omitted, the Contractor shall obtain and furnish to the Architect bona fide proposals from recognized suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the Contractor's expense. The Contractor shall state in the estimate any extension of time required for the completion of the Work if the change or extra work is ordered.

7.3.3 Delete the first sentence of the sub-section and replace as follows:

If the Construction Change Directive provides for an adjustment to the Contract Sum, and if the Contract Documents include a unit price for the work that is the subject of such directive, such unit price shall be the basis of the adjustment to the Contract Sum, unless the Owner, in its sole discretion, chooses another method. If, however, the Contract Documents do not include a unit price for such work, the adjustment shall be based on one of the following methods, as selected by the Owner:

In sub-heading .2 delete “stated in the Contract Documents or” after “Unit prices”.

7.3.4 Delete sub-section 7.3.4 and replace as follows:

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that, in the opinion of the Architect, application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner, the applicable unit prices shall be equitably adjusted.

7.3.5 In the first sentence add after “the Work involved and” as follows:

, within five (5) calendar days from receipt of the Construction Change Directive,”

Insert “by written notice” after “advise the Architect”.

Add to the end of the sub-section as follows:

Failure to so advise the Architect within such 5-day period (1) shall be interpreted as Contractor's agreement with the proposed method of adjustment; (2) shall constitute an irrevocable waiver of any right of the Contractor to submit a claim on account of the method of adjustment; and (3) shall cause the Construction Change Directive to be deemed and constitute a Change Order.

7.3.6 In the second sentence delete "recorded as" after "immediately shall be" and replace with "deemed and shall constitute".

7.3.7 Delete first sentence and replace as follows:

If the proposed method of adjustment in the Contract Sum is based on unit prices that are stated in the Contract Documents, such unit prices shall be the basis of any adjustment to the Contract Sum, unless the Owner has chosen another method pursuant to subparagraph 7.3.3. If the proposed method of adjustment is not based on such unit prices and the Contractor objects to the proposed method of adjustment, the Contractor must notify the Architect of such objection in writing within five (5) calendar days from Contractor's receipt of the Construction Change Directive. Failure to so object will irrevocably waive any such objections and claims on account of such method of adjustment, and the Construction Change Directive shall be deemed and shall constitute a Change Order. If the Contractor does so object, the adjustment to the Contract Sum shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit.

In sub-heading .4 insert "and" after "and insurance," and delete ", and sales, use or similar taxes related to the Work" after "permit fees".

Delete sub-heading .5 and replaces as follows:

.5 A reasonable allowance for overhead and profit.

7.3.9 Delete the end of the first sentence starting after "Directive to the Owner," and replace as follows:

amounts for such changes in the Work shall not be included in Applications for Payment. Such amounts shall only be included in an Application for Payment after the adjustment for the Construction Change Directive has been included in a Change Order signed by the Owner and the Contractor.

ARTICLE 8 TIME

8.2.2 In the first sentence delete ", except by agreement or instruction of the Owner in writing, prematurely".

8.2.4 Add new sub-sections 8.2.4 and 8.2.5 as follows:
-8.2.5

§ 8.2.4 Unless specifically required by law, no payment under this Contract shall be due until the construction schedule, required by Section 3.10, and conforming to the requirements of the General Requirements has been accepted by the Architect.

§ 8.2.5 If the Architect in reviewing any Application for Payment determines that the amount of completed Work in place as certified by the Architect is less than 90% of the Work in place required by the Contractor's construction schedule or schedule of values provided for in Section 9.2, or that there have been delays to critical paths and the Contract completion date will not be met, or that, in the Owner's sole discretion, there is reasonable concern that the Work will not be Substantially Complete by the date required in the Contract Documents, the Contractor shall be required to submit a recovery schedule with a written description of the steps the Contractor intends to take to put the Project back on schedule. At the Owner's option, the Contractor shall take some or all of the following actions at no additional cost to the Owner:

.1 Increase the number of workers on the site, in such quantities and trades as will substantially eliminate the backlog of work;
.2 Increase the number of working hours per shift, shifts per day, working days per week, amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate backlog of work; or
.3 Reschedule activities so that the completion dates initially scheduled will be met.

8.3.1 Insert "(except weather)" after "casualties or other causes".

Delete "pending mediation and arbitration" after "delay authorized by Owner".

Add to the end of the sub-section as follows:

, and this shall be the Contractor's sole remedy for such delay. Under no circumstances will the Contractor be entitled to an increase in the Contract Sum, or to any other damages, on account of or in connection with any delay, regardless of the cause of such delay, and Contractor agrees not to make any claim for such damages, including, but not limited, claims for damages on account of having to perform out-of-sequence work, claims for damages on account of loss of production, and claims for damages on account of hindrances or interference with the work.

8.3.3 Delete sub-section 8.3.3.

8.3.4 Add new sections 8.3.4 and 8.3.5 as follows:
-8.3.5

§ 8.3.4 No extension of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contractor, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

§ 8.3.5 The Contractor hereby agrees that the Contractor shall have no claim for damages of any kind against the Owner or the Architect on account of any delay in the commencement of the Work and/or any hindrance, delay or suspension of any portion of the Work, whether such delay is caused by the Owner, the Architect, or otherwise, except as and to the extent expressly provided in G.L. c. 30, §39N. The Contractor acknowledges that the Contractor's sole remedy for any such delay and/or suspension will be an extension of time as provided in this Article.

8.4 Add new section 8.4 as follows:

§ 8.4 LIQUIDATED DAMAGES

§ 8.4.1 It is expressly understood and agreed, by and between the Contractor and Owner, that the time for the completion of the Work described herein is a reasonable time for the completion of same, taking into consideration the average climatic range and usual industrial and/or residential conditions prevailing in this locality. If the said Contractor shall neglect, fail or refuse to complete the Work within the times herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Owner $2,000.00, not as a penalty but as liquidated damages for such breach of contract, for each and every calendar day that the Contractor shall be in default after the time stipulated for completing the Work. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be deducted by the Owner from periodic payments.

ARTICLE 9 SCHEDULE OF VALUES

9.2 Add to the end of the section as follows:

, and shall be revised if later found by the Architect to be inaccurate. In addition, the Contractor shall submit to the Architect, at least 14 days before the first Application for Payment, a Cash Flow Schedule that shows the percentage completion to be obtained and the total dollar value of Work to be completed as of the first of each month until Substantial Completion. All calculations in the Cash Flow Schedule shall be on the basis of Work in place and shall exclude the value of materials delivered but not in place.

9.2.1 Add new sub-section 9.2.1 as follows:

§ 9.2.1 The Cash Flow Schedule shall be based on an orderly progression of the Work allowing adequate time for each operation (including adequate time for submission and review of submittals) and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Cash Flow Schedule will be reviewed by the Architect for compliance with the requirements of the Contract Documents. Unless specifically required by law, no payment under this Contract shall be due until the Cash Flow Schedule has been reviewed and approved by the Architect. The Architect's review of the Cash Flow Schedule shall not impose any duty on the Architect or the Owner with respect to the timing, planning, scheduling or execution of the Work. In particular if the Contractor proposes a Cash Flow Schedule indicating a date of Substantial Completion which is earlier than the Contract Time the Contractor shall not be entitled to additional payment or compensation of any kind if for any reason the full Contract Time is required to achieve Substantial Completion of the Work.

9.3.1.1 Delete sub-section 9.3.1.1.

9.3.2 Add to the end of the sub-section as follows:

The Owner may deduct the amount of such costs from payments due the Contractor.

9.4.1 Insert at the beginning of the first sentence as follows:

Subject to the Contractor's compliance with Section 9.3 and the provisions of Section 9.6,

9.5.1 Add new sub-headings .8, .9, .10, .11, and .12 as follows:

.8 failure of the Contractor or mechanical or electrical trade subcontractors to comply with requirements of the General Requirements for maintaining

record drawings. The Contractor shall check record drawings each month. Written confirmation that the record drawings are current will be required by the Architect before approval of the Contractor's monthly payment requisition;
.9 failure of the Contractor to provide required warranties under Section 9.3, claims for direct payment, or reasonable evidence indicating probable filing of such claims;
.10 costs incurred by the Owner under Section 10.2.5;
.11 failure of the Contractor to submit prerequisite documentation required by the General Requirements; or
.12 liquidated damages due the Owner pursuant to Section 8.4.

9.5.3 Delete sub-section 9.5.3.

9.6.4 Delete "If the Contractor fails to furnish such evidence within seven days," from the beginning of the second sentence.

9.6.5 Delete sub-section 9.6.5.

9.6.7 Delete sub-section 9.6.7.

9.6.8 Add new sub-section 9.6.8 as follows:

§ 9.6.8 Notwithstanding the provisions of Section 9.6 all progress payments shall be made in accordance with Chapter 30, Sections 39F, 39G and 39K (as appropriate) of the General Laws of the Commonwealth of Massachusetts, as amended.

9.7 Delete section 9.7.

9.8.1 Add to the end of the sub-section as follows:

In addition, Substantial Completion for the entire Project shall be achieved only when: (1) the Owner has beneficial occupancy and use of the entire Project for all its intended uses; (2) all Project systems included in the Work are operational and acceptable to the Owner; (3) all governmental inspections for the Project have been successfully completed, all governmental approvals and related paperwork have been delivered to the Owner, and final and unconditional certificates of occupancy for the entire Project have been delivered to the Owner, (4) the only remaining Work to be performed is minor in nature and the remaining Work may reasonably be performed without having a material adverse effect on or materially interfering with the Owner's occupancy and use of the Project and (5) all prerequisites to Substantial Completion defined in the Contract Documents have been completed.

9.8.2 Add to the end of the first sentence as follows:

> together with the estimated value of completing or correcting such items (the "Punchlist") and (2) the permits and certificates referenced in Section 13.5. The Architect shall have the right to modify and supplement the Punchlist, including the estimated value of completion or correction.

9.8.5 Delete sub-section 9.8.5 and replace as follows:

> § 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor by the Architect. The certificate shall state the date of substantial completion, shall state any consequent responsibilities of the Contractor and the Owner in accordance with the Contract Documents. The Contractor shall complete and correct any incomplete and defective work within forty-five (45) calendar days from the date of Substantial Completion

9.8.6 Add new sub-section 9.8.6 as follows:

> § 9.8.6 Services provided by the Architect to conduct more than three (3) inspections of completed Work and any inspections beyond sixty (60) days after the date of substantial completion of any portion of the Work as stated in the Agreement shall be paid by the Contractor to the Owner. The Owner may deduct the cost of such services and inspections from payments due the Contractor.

9.9.1 Delete the end of the first sentence starting after "Work at any stage".

Delete the second sentence and replace as follows:

> Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner has accepted in writing the responsibilities assigned to it and the Contractor for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance.

Delete the second to last sentence.

9.10.1 Add to the end of the sub-section as follows:

> By Final Completion, the Contractor shall have completed its performance of all Punchlist items, completed all balancing of mechanical and other applicable systems and all seasonal system adjustments that are reasonably necessary to proper functioning of the completed Project, delivered to the Owner all operations and maintenance manuals and completed related

training for such manuals, and delivered to the Owner all required warranties and guarantees.

9.10.3 Delete sub-sections 9.10.3 and 9.10.4.
-9.10.4

9.10.5 Insert "for payment for Work performed and of all other claims of which the payee knew or should have known at the time of final payment," after "claims that payee"

9.10.6 Add new sub-section 9.10.6 as follows:

§ 9.10.6 Notwithstanding anything in the Contract Documents to the contrary, final payment shall be made in accordance with the requirements of G.L.c.30, §39K (building projects) or §39G (public works projects), as amended.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.2.1 Add new sub-heading .4 as follows:

.4 work or property of the Owner, its tenants, or other parties at or near the Project site with the Owner's permission.

10.2.5 At the beginning and end of the first sentence:

Delete "and" after "10.2.1.2".

Insert "and 10.2.1.4" after "10.2.1.3".

Delete the remainder of the first sentence as follows:

, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

Add to the end of the sub-section as follows:

Where the damage or loss presents an immediate danger to the public, the Owner, in its sole discretion and at the Contractor's expense, may promptly remedy such damage or loss without prior notice to the Contractor.

10.2.9 Add new sub-sections 10.2.9, 10.2.10, 10.2.11, 10.2.12, and 10.2.13 as follows:
-10.2.13

§ 10.2.9 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

§ 10.2.10 The Contractor shall at all times protect excavations, trenches, buildings and materials from rain water, groundwater, backup or leakage of sewers, drains and other piping, and from water of any other origin and shall remove promptly any accumulation of water. The Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

§ 10.2.11 The Contractor shall remove snow and ice which might result in damage or delay.

§ 10.2.12 During the progress of the Work and at all times prior to the date of Substantial Completion or occupancy of the Work by the Owner, whichever is earlier, the Contractor shall provide temporary heat, ventilation, and enclosure, adequate to permit the Work to proceed in a timely fashion, and to prevent damage to completed Work or Work in progress, or to materials stored on the premises. The use of the permanent heating and/or ventilation systems for temporary heat and/or ventilation shall be subject to the prior written approval of the Owner and Architect.

§ 10.2.13 [G.L. c.149, §44F(1)] The Contractor shall install weather protection and furnish adequate heat in the protected area from November 1 to March 31.

10.3.1 Delete the second sentence and replace as follows:

The Contractor shall not cause or permit any introduction onto, under, or near the Owner's property of any hazardous materials or substances as defined by any applicable law, and shall not cause of permit any release, discharge, transportation, storage, or disposal of such materials or substances onto, under, or near the Owner's property or areas near the Owner's property. If the Contractor encounters or recognizes on the site any material known or reasonably believed to be hazardous, including but not limited to asbestos or polychlorinated biphenyl (PCB), the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Contractor and the Owner shall cooperate in implementing measures to remove or contain said material and the Contractor shall comply with all directions of the Architect in the implementation of such removal or containment.

10.3.2 Delete sub-sections 10.3.2, 10.3.3, and 10.3.4.

10.3.5 Delete the remainder of the sentence starting after "obligations under" and replace as follows:

Article 10 or for any violation of applicable law related to the Contractor's noncompliance with the provisions of this Article 10.

10.3.6 Delete sub-section 10.3.6.

10.3.7 Add new sub-section 10.3.7 as follows:

§ 10.3.7 The parties anticipate that certain hazardous substances and/or materials may be discovered at the site. When such conditions are set forth in the Contract Documents, the Contractor acknowledges that such conditions have been considered in establishing the Contract Time and Contract Sum. No extension of the Contract Time or increase in the Contract Sum shall be claimed or allowed with respect to any hazardous substances or materials located at the site which were disclosed in the Contract Documents. The Contractor shall strictly comply with all laws, regulations, rules, orders, ordinances and the like related to the excavation, storage, removal and disposal of any such hazardous substances or materials.

ARTICLE 11 INSURANCE AND BONDS

11.1.2 Delete sub-section 11.1.2 and replace as follows:

§ 11.1.2 The insurance required by Section 11.1.1 shall include all major divisions of coverage, and shall be on a comprehensive general basis including Premises and Operations (including X-C-U), Owner's and Contractor's Protective, Products and Completed Operations, and Owned, Non-owned, and Hired Motor Vehicles. Such insurance shall be written for not less than any limits of liability required by law or those set forth in the Contract Documents, whichever is greater.

All insurance shall be written on an occurrence basis, unless the Owner approves in writing coverage on a claims-made basis. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and any further period during which coverage is required to be maintained after final payment by the Contract Documents. The Owner shall be named an Additional Insured on all policies.

Coverage for such liability insurance shall be provided by a company or companies reasonably acceptable to the Owner and authorized to do business in Massachusetts. Contractor shall furnish to Owner written confirmation as to the insurance carrier's most current financial ratings prior to commencing work.

11.1.3 Add to the end of the sub-section as follows:

These certificates shall set forth evidence of all coverage required by Sections 11.1.1 and 11.1.2. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

11.1.3.1 Add new sub-sections 11.1.3.1 and 11.1.3.2 as follows:
-11.1.3.2

11.1.3.1 The Contractor shall be responsible for having acceptable insurance coverage provided by or on behalf of all Subcontractors, with such insurance to be similar to that required of the Contractor under the Agreement and these General Conditions. The Contractor shall not allow any Subcontractor to commence Work on the Project prior to the Contractor's receipt of certificates of insurance that are acceptable in form and limits to the Owner; the Owner shall have no obligation to pay the Contractor for any Work performed by a Subcontractor who has not supplied acceptable insurance certificates prior to starting its Work. The Owner shall be named an additional insured on all such certificates.

11.1.3.2 All insurance policies shall contain provisions or endorsements necessary to assure coverage of claims by one insured against another. All required insurance policies are to be endorsed to state that the Contractor's policies shall be primary to all other insurance available to the Owner and other specified additional insureds for liability arising out of or resulting from the Contractor's operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

11.1.4 Insert "the Owner's Project Manager," after "(1) the Owner,".

11.1.5 Add new sub-section 11.1.5 as follows:

§ 11.1.5 The Contractor shall carry insurance of the types and in the minimum amounts as articulated in the Owner-Contractor Agreement.

11.2 Delete section 11.2 and replace as follows:

§ 11.2 OWNER'S LIABILITY INSURANCE
The Contractor shall procure and pay for an Owner's policy of Owner's protective liability insurance insuring the Owner and its officers, employees and agents against claims which may arise from operations under the Contract or relating thereto.

11.3.1 Delete sub-section 11.3.1 and replace as follows:

§ 11.3.1 The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. Coverage for such liability insurance shall be provided by a company or companies reasonably acceptable to the Owner. Contractor shall furnish to Owner written confirmation as to the insurance carrier's most current financial ratings prior to commencing work. Such insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the work and shall insure against the perils of fire and extended coverage and shall include "all risks" insurance for physical loss or damage including without duplication, theft, vandalism and malicious mischief. This insurance shall also cover portions of the Work stored off the site or in transit. If this insurance is written with stipulated amounts deductible, the Owner shall not be responsible for any difference between the payments made by the insurance carrier and the claim. The policy shall contain a provision that coverages afforded under policies will not be canceled or allowed to expire until at least 30 days' written notice has been given to the Owner. The Owner shall be named insured within the policy.

11.3.1.1 Delete sub-sections 11.3.1.1, 11.3.1.2, 11.3.1.3, 11.3.1.4, and 11.3.1.5.
-11.3.1.5

11.3.2 Delete sub-sections 11.3.2, 11.3.3, 11.3.4, 11.3.5, 11.3.6, and 11.3.7.
-11.3.7

11.3.8 Delete the first sentence.

11.3.9 Delete sub-sections 11.3.9 and 11.3.10.
-11.3.10

11.3.11 Add new sub-section 11.3.11 as follows:

§ 11.3.11 The Owner shall have the power to adjust and settle with its insurers any loss for which it has obtained insurance.

Upon the occurrence of an insured loss, the Owner and the Contractor shall cooperate with each other and with each other's insurer in the submission of claims and related information and the distribution of any insurance proceeds. If after such a loss no other special agreement is

made, replacement of damaged work shall be covered by an appropriate change order.

11.4.1 Delete "Owner shall have the right to require the".

Delete "to" after "Contractor" and replace with "shall".

Delete the end of the sentence starting after "obligations arising thereunder" and replace as follows:

, each in the amount of 100% of the Contract Price, and each by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and acceptable to the Owner. The attorney-in-fact who signs the bonds on behalf of the surety, must affix to each bond a certified and current copy of the power of attorney. The Performance and Payment Bonds shall be written in a form satisfactory to the Owner.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.2.1 Add to the end of the sub-section as follows:

The Contractor shall bear the cost of any loss or damages to the Owner resulting from such failure or defect.

12.2.2.1 Delete the third sentence.

Add to the end of the sub-section as follows:

If the correction or repair of any of the Work is required to avoid impacts to the maintenance, operation or safety of any portion of the Project site or the Owner's property, the Owner reserves the right to undertake the repairs prior to notifying the Contractor or without waiting for the Contractor to respond, without waiving the Owner's rights under the warranties and the Owner's right to correct work under Section 2.4.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 Delete the end of the sentence following the words "by the law of the", and insert the words "Commonwealth of Massachusetts" at the end of the sentence as revised.

13.2.1 In the second sentence delete "Except as provided in Section 13.2.2".

13.2.2 Delete sub-section 13.2.2.

13.5.4 Delete sub-section 13.5.4 and replace as follows:

§ 13.5.4 The Contractor shall obtain and deliver promptly to the Architect any occupancy permit and any certificates of final inspection of any part of the Contractor's work and operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work.

13.7 Delete section 13.7.

13.7.1 Add new sub-section 13.7.1 as follows:

§ 13.7.1 It is expressly agreed that the obligations of the Contractor hereunder arise out of contractual duties, and that the failure of the Contractor to comply with the requirements of the Contract Documents shall constitute a breach of contract, not a tort, for the purpose of applicable statutes of limitation and repose. Any cause of action which the Owner may have on account of such failure shall be deemed to accrue only when the Owner has obtained actual knowledge of such failure, not before.

13.8 Add new section 13.8 as follows:

§ 13.8 LIMITATION OF LIABILITY

§ 13.8.1 The Owner shall be liable, if ever, only to the extent of its interest in the Project; and no officer, director, partner, agent or employee of the Owner shall ever be personally or individually liable with respect to this Contract or the Work. Each Subcontract shall include the foregoing limitation, which shall be effective if the Owner ever succeeds to the Contractor's rights and obligations under a Subcontract.

13.9 Add new section 13.9 as follows:

§ 13.9 DEFENSE OF SUITS

§ 13.9.1 The Contractor shall be responsible for, shall defend and pay all costs, attorneys' fees and liabilities both direct and indirect as a result of suits arising out of this Contract.

§ 13.9.2 Neither final acceptance nor occupation of the premises by the Owner shall relieve the Contractor of responsibility for all claims for labor, materials, and equipment arising out of this Contract.

§ 13.9.3 The Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses, and expenses including attorneys' fees arising out of or resulting from the performance of the work.

ACTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1.1 Insert in the beginning of the first sentence as follows:

Provided that the Contractor is not in breach of any of its obligations under the Contract,

Delete sub-headings .1, .2, and .4.

14.1.2 Delete sub-section 14.1.2.

14.1.3 Delete sub-section 14.1.3 and replace as follows:

§ 14.1.3 If one of the above reasons exists, the Contractor may, upon seven days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work properly executed and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. The payment for materials or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to the Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interest.

14.1.4 Delete sub-section 14.1.4.

14.2.1 Delete “repeatedly” from the beginning of sub-headings .1 and .3.

Insert new sub-headings .4 and .5 after sub-heading .3 as follows:

.4 becomes the subject of a voluntary petition in bankruptcy or any voluntary proceeding related to insolvency, receivership, liquidation or comparable proceeding or any assignment for the benefit of creditors or becomes the subject of an involuntary petition in bankruptcy or any involuntary proceeding related to insolvency, receivership, liquidation or comparable proceeding or any assignment for the benefit of creditors.

.5 submits three successive Applications for Payment, each of which indicate that the actual Work completed is less than 90 percent of the values estimated in the construction schedule (submitted by the Contractor pursuant to Section 3.10.1) to be completed by the respective dates.

14.2.2 In the first sentence delete "upon certification by the Initial Decision Maker that sufficient cause exists to justify such action".

Delete the second sentence of sub-heading .3.

14.2.4 In the first sentence:

Insert "all costs and losses incurred by the Owner on account of the Contractor's failure to comply with the Contract Documents and" after "the Work, including".

Insert "and Owner's Project Manager's" after "for the Architect's".

Delete the last sentence of the sub-section and replace as follows:

The Owner shall be entitled to hold all amounts due the Contractor at the date of termination until all of the Owner's damages have been established, and to apply such amounts to such damages.

14.3.2 Insert ", subject to compliance with the conditions of Section 8.3." at the end of the first sentence.

Delete the second sentence.

14.4.2 In sub-heading .3 delete "and" after "all existing contracts" and replace with "except for subcontracts, if any, that Owner elects to assume, terminate all"

14.4.3 Delete sub-section 14.4.3 and replace as follows:

§ 14.4.3 In the event that the Contract is terminated for the Owner's convenience, the Contractor shall be reimbursed in accordance with the Contract Documents for all Work properly performed up to the termination date, and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. Payment for materials or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to the Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interest. The Contractor shall not be entitled to payment for overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

15.1.1 Delete sub-section 15.1.1 and replace as follows:

§ 15.1.1 DEFINITION
The word "Claim" shall mean a written demand by the Contractor for an increase in the Contract Time or the Contract Sum. The Contractor is responsible for substantiating its Claims. The word "Claim" shall not include claims by the Owner. The Owner may withhold from the Contractor the value of any claims against the Contractor in accordance with Massachusetts General Laws, including, but not limited to, Sections 39G and 39K of Chapter 30.

15.1.2 Delete sub-section 15.1.2 and replace as follows:

§ 15.1.2 NOTICE OF CLAIMS
Contractor must initiate Claims within fourteen (14) calendar days after occurrence of the event giving rise to such Claim by written notice to the Architect and the Owner. Such written notice must (1) be signed by the Contractor; (2) conspicuously identify on its face that the notice serves as a notice of claim; (3) explain in sufficient detail the basis of the Claim; (4) identify the date of the event giving rise to such Claim; and (5) state the exact dollar amount of the increase in the Contract Sum being requested, if any, and the number of days extension to the Contract Time sought, if any.

15.1.3 Delete "Section 9.7 and" after "as provided in".

Delete the final sentence.

15.1.5.1 In the second sentence delete "of cost and" after "include an estimate".

15.1.5.2 Delete sub-section 15.1.5.2.

15.1.6 Delete sub-section 15.1.6.

15.2.1 In the third sentence:

Delete "mediation" after "condition precedent to" and replace with "litigation".

Delete the end of the sentence beginning after "payment is due".

15.2.2 Delete sub-section 15.2.2 and replace as follows:

§ 15.2.2 The Initial Decision Maker will review Claims and within 30 days of the receipt of the Claim take one or more of the following actions: (1) request additional supporting data from the Contractor; (2) notify the Contractor that the Initial Decision Maker requires additional time to resolve the Claim; and/or (3) reject the Claim in whole or in part.

15.2.3 Delete the last sentence.

15.2.4 Delete sub-section 15.2.4 and replace as follows:

> § 15.2.4 If the Architect requests the Contractor to furnish additional supporting data in connection with a Claim, the Contractor shall provide such data within ten (10) calendar days of such request. If the Contractor is of the opinion that it is impossible to provide such data within such time, the Contractor shall notify the Architect of such opinion in writing within such ten-day period. If the Architect determines that it is impossible for such data to be provided within such ten-day period through no fault of the Contractor, the Contractor shall provide such data within 30 calendar days of the Architect's request, unless the Architect fixes another date, in which case the data must be submitted by the date so fixed. Failure of the Contractor to provide such data within the time prescribed herein shall result in the irrevocable waiver of the Claim.

15.2.5 Delete the last sentence and replace as follows:

> The rejection of a claim by the Architect and any decisions of the Owner with respect to the same, and the interpretations by the Architect of the plans, drawings and specifications, shall be final and binding on the Contractor in accordance with Section 39J of Chapter 30 of the Massachusetts General Laws.

15.2.6 Delete sub-section 15.2.6 in is entirety.

15.2.7 Delete the capitalized word, "Claim," and replace with lower-case word, "claim," in the first and second sentences.

15.2.8 Delete sub-section 15.2.8.

15.3 Delete sections 15.3 and 15.4 in their entirety.
-15.4

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DOCUMENT 00 73 43

WAGE RATES, REPORTING, AND STATEMENT OF COMPLIANCE

PART 1 − GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other division 1 Specifications Sections, apply to this Section.

1.2 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 recording.
   1. All applicable provisions of law are a part of this Contract.
   2. Incorrect citations of statutes in this Document 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.

1.3 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 Document and made a part of the Contract, in accordance with and subject to the provisions of M.G.L. 149, Section 26 and 27, as amended.
   1. The Wage Determination Schedule provided to the Awarding Authority by Governmental Authorities is appended to this document. 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 the other benefits under M.G.L. 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 Document 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 of 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 Documents 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 the 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.
   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, section 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 Document.

END OF DOCUMENT

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

Prevailing Wage Rates

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

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

RONALD L. WALKER, II
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: The Town of Swampscott

Contract Number:

City/Town: SWAMPSCOTT

Description of Work: Hadley Elementary School - Removal of one of fourteen (14) existing cast iron steam boilers, boiler feed system and piping. New work includes the installation of three (3) new vertical steel gas fired

Job Location: 24 Redington Street, Swampscott, MA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- 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 from the Department of Labor Standards ("DLS") 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 any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person 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 DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- 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. Awarding authorities are required to request these updates 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, 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. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to 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. A sample of a payroll reporting form may be obtained at 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.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- 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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.15	$10.91	$10.08	$0.00	$53.14
	12/01/2016	$32.15	$10.91	$10.89	$0.00	$53.95
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.22	$10.91	$10.08	$0.00	$53.21
	12/01/2016	$32.22	$10.91	$10.89	$0.00	$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.34	$10.91	$10.08	$0.00	$53.33
	12/01/2016	$32.34	$10.91	$10.89	$0.00	$54.14
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$88.29	$9.80	$19.23	$0.00	$117.32
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	06/01/2016	$32.90	$11.50	$7.10	$0.00	$51.50
	12/01/2016	$33.90	$11.50	$7.10	$0.00	$52.50
	06/01/2017	$34.90	$11.50	$7.10	$0.00	$53.50
	12/01/2017	$35.90	$11.50	$7.10	$0.00	$54.50
	06/01/2018	$36.90	$11.50	$7.10	$0.00	$55.50
	12/01/2018	$37.90	$11.50	$7.10	$0.00	$56.50
	06/01/2019	$38.90	$11.50	$7.10	$0.00	$57.50
	12/01/2019	$39.90	$11.50	$7.10	$0.00	$58.50
	06/01/2020	$40.90	$11.50	$7.10	$0.00	$59.50
	12/01/2020	$41.90	$11.50	$7.10	$0.00	$60.50
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2016	$41.62	$6.97	$16.21	$0.00	$64.80
	01/01/2017	$42.92	$6.97	$16.21	$0.00	$66.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.05	$6.97	$10.54	$0.00	$44.56
2	65	$27.05	$6.97	$10.54	$0.00	$44.56
3	70	$29.13	$6.97	$11.35	$0.00	$47.45
4	75	$31.22	$6.97	$12.16	$0.00	$50.35
5	80	$33.30	$6.97	$12.97	$0.00	$53.24
6	85	$35.38	$6.97	$13.78	$0.00	$56.13
7	90	$37.46	$6.97	$14.59	$0.00	$59.02
8	95	$39.54	$6.97	$15.40	$0.00	$61.91

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$27.90	$6.97	$10.54	$0.00	$45.41
2	65	$27.90	$6.97	$10.54	$0.00	$45.41
3	70	$30.04	$6.97	$11.35	$0.00	$48.36
4	75	$32.19	$6.97	$12.16	$0.00	$51.32
5	80	$34.34	$6.97	$12.97	$0.00	$54.28
6	85	$36.48	$6.97	$13.78	$0.00	$57.23
7	90	$38.63	$6.97	$14.59	$0.00	$60.19
8	95	$40.77	$6.97	$15.40	$0.00	$63.14

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LYNN)*	08/01/2016	$50.76	$10.18	$19.22	$0.00	$80.16
	02/01/2017	$51.33	$10.18	$19.22	$0.00	$80.73

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.38	$10.18	$19.22	$0.00	$54.78
2	60	$30.46	$10.18	$19.22	$0.00	$59.86
3	70	$35.53	$10.18	$19.22	$0.00	$64.93
4	80	$40.61	$10.18	$19.22	$0.00	$70.01
5	90	$45.68	$10.18	$19.22	$0.00	$75.08

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.67	$10.18	$19.22	$0.00	$55.07
2	60	$30.80	$10.18	$19.22	$0.00	$60.20
3	70	$35.93	$10.18	$19.22	$0.00	$65.33
4	80	$41.06	$10.18	$19.22	$0.00	$70.46
5	90	$46.20	$10.18	$19.22	$0.00	$75.60

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$36.95	$7.45	$14.00	$0.00	$58.40
	12/01/2016	$37.95	$7.45	$14.00	$0.00	$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2016	$38.08	$9.80	$16.82	$0.00	$64.70
	03/01/2017	$39.05	$9.80	$16.82	$0.00	$65.67
	09/01/2017	$40.06	$9.80	$16.82	$0.00	$66.68
	03/01/2018	$41.06	$9.80	$16.82	$0.00	$67.68
	09/01/2018	$42.10	$9.80	$16.82	$0.00	$68.72
	03/01/2019	$43.13	$9.80	$16.82	$0.00	$69.75

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.04	$9.80	$1.63	$0.00	$30.47
2	60	$22.85	$9.80	$1.63	$0.00	$34.28
3	70	$26.66	$9.80	$11.93	$0.00	$48.39
4	75	$28.56	$9.80	$11.93	$0.00	$50.29
5	80	$30.46	$9.80	$13.56	$0.00	$53.82
6	80	$30.46	$9.80	$13.56	$0.00	$53.82
7	90	$34.27	$9.80	$15.19	$0.00	$59.26
8	90	$34.27	$9.80	$15.19	$0.00	$59.26

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.53	$9.80	$1.63	$0.00	$30.96
2	60	$23.43	$9.80	$1.63	$0.00	$34.86
3	70	$27.34	$9.80	$11.93	$0.00	$49.07
4	75	$29.29	$9.80	$11.93	$0.00	$51.02
5	80	$31.24	$9.80	$13.56	$0.00	$54.60
6	80	$31.24	$9.80	$13.56	$0.00	$54.60
7	90	$35.15	$9.80	$15.19	$0.00	$60.14
8	90	$35.15	$9.80	$15.19	$0.00	$60.14

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LYNN)*	01/01/2016	$46.44	$10.90	$18.71	$1.30	$77.35

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (Lynn)*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.22	$10.90	$12.21	$0.00	$46.33
2	60	$27.86	$10.90	$13.71	$1.30	$53.77
3	65	$30.19	$10.90	$14.71	$1.30	$57.10
4	70	$32.51	$10.90	$15.71	$1.30	$60.42
5	75	$34.83	$10.90	$16.71	$1.30	$63.74
6	80	$37.15	$10.90	$17.71	$1.30	$67.06
7	90	$41.80	$10.90	$18.71	$1.30	$72.71

Notes:

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

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$45.23	$10.00	$15.15	$0.00	$70.38
	12/01/2016	$46.48	$10.00	$15.15	$0.00	$71.63
	06/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
	12/01/2017	$48.48	$10.00	$15.15	$0.00	$73.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.71	$7.85	$0.00	$0.00	$33.56
2	55	$28.28	$7.85	$3.66	$0.00	$39.79
3	60	$30.85	$7.85	$3.99	$0.00	$42.69
4	65	$33.42	$7.85	$4.32	$0.00	$45.59
5	70	$35.99	$7.85	$14.11	$0.00	$57.95
6	75	$38.56	$7.85	$14.44	$0.00	$60.85
7	80	$41.13	$7.85	$14.77	$0.00	$63.75
8	90	$46.27	$7.85	$15.44	$0.00	$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
DEMO: BURNERS *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.50	$7.45	$13.55	$0.00	$57.50
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$36.25	$7.45	$13.55	$0.00	$57.25
DEMO: WRECKING LABORER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	12/01/2015	$35.50	$7.45	$13.55	$0.00	$56.50
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$58.86	$9.80	$19.23	$0.00	$87.89
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$63.06	$9.80	$19.23	$0.00	$92.09
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$88.23	$9.80	$19.23	$0.00	$117.26
DRAWBRIDGE OPERATOR (Construction) *ELECTRICIANS LOCAL 103* For apprentice rates see "Apprentice- ELECTRICIAN"	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.47	$13.00	$0.55	$0.00	$32.02
2	40	$18.47	$13.00	$0.55	$0.00	$32.02
3	45	$20.78	$13.00	$12.34	$0.00	$46.12
4	45	$20.78	$13.00	$12.34	$0.00	$46.12
5	50	$23.09	$13.00	$12.71	$0.00	$48.80
6	55	$25.39	$13.00	$13.07	$0.00	$51.46
7	60	$27.70	$13.00	$13.44	$0.00	$54.14
8	65	$30.01	$13.00	$13.81	$0.00	$56.82
9	70	$32.32	$13.00	$14.18	$0.00	$59.50
10	75	$34.63	$13.00	$14.55	$0.00	$62.18

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

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2016	$54.53	$14.43	$14.96	$0.00	$83.92
	01/01/2017	$55.86	$15.28	$15.71	$0.00	$86.85

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.27	$14.43	$0.00	$0.00	$41.70
2	55	$29.99	$14.43	$14.96	$0.00	$59.38
3	65	$35.44	$14.43	$14.96	$0.00	$64.83
4	70	$38.17	$14.43	$14.96	$0.00	$67.56
5	80	$43.62	$14.43	$14.96	$0.00	$73.01

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.93	$15.28	$0.00	$0.00	$43.21
2	55	$30.72	$15.28	$15.71	$0.00	$61.71
3	65	$36.31	$15.28	$15.71	$0.00	$67.30
4	70	$39.10	$15.28	$15.71	$0.00	$70.09
5	80	$44.69	$15.28	$15.71	$0.00	$75.68

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 4*	01/01/2016	$38.17	$14.43	$14.96	$0.00	$67.56
	01/01/2017	$39.10	$15.28	$15.71	$0.00	$70.09

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2016	$41.37	$10.00	$15.15	$0.00	$66.52
	05/01/2017	$42.25	$10.00	$15.15	$0.00	$67.40
	11/01/2017	$42.98	$10.00	$15.15	$0.00	$68.13
	05/01/2018	$43.69	$10.00	$15.15	$0.00	$68.84
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2016	$42.82	$10.00	$15.15	$0.00	$67.97
	05/01/2017	$43.71	$10.00	$15.15	$0.00	$68.86
	11/01/2017	$44.44	$10.00	$15.15	$0.00	$69.59
	05/01/2018	$45.16	$10.00	$15.15	$0.00	$70.31
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2016	$21.98	$10.00	$15.15	$0.00	$47.13
	05/01/2017	$22.51	$10.00	$15.15	$0.00	$47.66
	11/01/2017	$22.93	$10.00	$15.15	$0.00	$48.08
	05/01/2018	$23.36	$10.00	$15.15	$0.00	$48.51
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103*	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$36.71	$10.00	$15.15	$0.00	$61.86
	12/01/2016	$37.75	$10.00	$15.15	$0.00	$62.90
	06/01/2017	$38.59	$10.00	$15.15	$0.00	$63.74
	12/01/2017	$39.42	$10.00	$15.15	$0.00	$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 2*	06/01/2016	$20.50	$7.45	$12.65	$0.00	$40.60
	12/01/2016	$20.50	$7.45	$12.65	$0.00	$40.60
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	03/01/2016	$42.13	$9.80	$17.62	$0.00	$69.55

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.07	$9.80	$1.79	$0.00	$32.66
2	55	$23.17	$9.80	$1.79	$0.00	$34.76
3	60	$25.28	$9.80	$12.25	$0.00	$47.33
4	65	$27.38	$9.80	$12.25	$0.00	$49.43
5	70	$29.49	$9.80	$14.04	$0.00	$53.33
6	75	$31.60	$9.80	$14.04	$0.00	$55.44
7	80	$33.70	$9.80	$15.83	$0.00	$59.33
8	85	$35.81	$9.80	$15.83	$0.00	$61.44

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	07/01/2016	$39.96	$7.85	$16.10	$0.00	$63.91
	01/01/2017	$40.91	$7.85	$16.10	$0.00	$64.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.98	$7.85	$0.00	$0.00	$27.83
2	55	$21.98	$7.85	$3.66	$0.00	$33.49
3	60	$23.98	$7.85	$3.99	$0.00	$35.82
4	65	$25.97	$7.85	$4.32	$0.00	$38.14
5	70	$27.97	$7.85	$14.11	$0.00	$49.93
6	75	$29.97	$7.85	$14.44	$0.00	$52.26
7	80	$31.97	$7.85	$14.77	$0.00	$54.59
8	90	$35.96	$7.85	$15.44	$0.00	$59.25

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.46	$7.85	$0.00	$0.00	$28.31
2	55	$22.50	$7.85	$3.66	$0.00	$34.01
3	60	$24.55	$7.85	$3.99	$0.00	$36.39
4	65	$26.59	$7.85	$4.32	$0.00	$38.76
5	70	$28.64	$7.85	$14.11	$0.00	$50.60
6	75	$30.68	$7.85	$14.44	$0.00	$52.97
7	80	$32.73	$7.85	$14.77	$0.00	$55.35
8	90	$36.82	$7.85	$15.44	$0.00	$60.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$24.33	$10.00	$0.00	$0.00	$34.33
2	60	$26.54	$10.00	$15.15	$0.00	$51.69
3	65	$28.75	$10.00	$15.15	$0.00	$53.90
4	70	$30.96	$10.00	$15.15	$0.00	$56.11
5	75	$33.17	$10.00	$15.15	$0.00	$58.32
6	80	$35.38	$10.00	$15.15	$0.00	$60.53
7	85	$37.60	$10.00	$15.15	$0.00	$62.75
8	90	$39.81	$10.00	$15.15	$0.00	$64.96

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$25.01	$10.00	$0.00	$0.00	$35.01
2	60	$27.29	$10.00	$15.15	$0.00	$52.44
3	65	$29.56	$10.00	$15.15	$0.00	$54.71
4	70	$31.84	$10.00	$15.15	$0.00	$56.99
5	75	$34.11	$10.00	$15.15	$0.00	$59.26
6	80	$36.38	$10.00	$15.15	$0.00	$61.53
7	85	$38.66	$10.00	$15.15	$0.00	$63.81
8	90	$40.93	$10.00	$15.15	$0.00	$66.08

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	11/01/2016	$43.40	$10.70	$23.07	$2.32	$79.49
	02/01/2017	$44.50	$10.70	$23.07	$2.32	$80.59
	08/01/2017	$45.60	$10.70	$23.07	$2.32	$81.69
	02/01/2018	$46.75	$10.70	$23.07	$2.32	$82.84
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2016	$46.17	$13.00	$16.39	$0.00	$75.56
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	11/01/2016	$43.40	$10.70	$23.07	$2.32	$79.49
	02/01/2017	$44.50	$10.70	$23.07	$2.32	$80.59
	08/01/2017	$45.60	$10.70	$23.07	$2.32	$81.69
	02/01/2018	$46.75	$10.70	$23.07	$2.32	$82.84
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
	12/01/2016	$33.15	$7.45	$12.65	$0.00	$53.25
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2016	$45.09	$11.75	$14.20	$0.00	$71.04
	09/01/2017	$47.09	$11.75	$14.20	$0.00	$73.04
	09/01/2018	$49.34	$11.75	$14.20	$0.00	$75.29
	09/01/2019	$51.84	$11.75	$14.20	$0.00	$77.79

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

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.55	$11.75	$10.45	$0.00	$44.75
2	60	$27.05	$11.75	$11.20	$0.00	$50.00
3	70	$31.56	$11.75	$11.95	$0.00	$55.26
4	80	$36.07	$11.75	$12.70	$0.00	$60.52

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.55	$11.75	$10.45	$0.00	$45.75
2	60	$28.25	$11.75	$11.20	$0.00	$51.20
3	70	$32.96	$11.75	$11.95	$0.00	$56.66
4	80	$37.67	$11.75	$12.70	$0.00	$62.12

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	09/16/2016	$44.05	$7.80	$20.85	$0.00	$72.70
	03/16/2017	$44.65	$7.80	$20.85	$0.00	$73.30

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 09/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.43	$7.80	$20.85	$0.00	$55.08
2	70	$30.84	$7.80	$20.85	$0.00	$59.49
3	75	$33.04	$7.80	$20.85	$0.00	$61.69
4	80	$35.24	$7.80	$20.85	$0.00	$63.89
5	85	$37.44	$7.80	$20.85	$0.00	$66.09
6	90	$39.65	$7.80	$20.85	$0.00	$68.30

Effective Date - 03/16/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.79	$7.80	$20.85	$0.00	$55.44
2	70	$31.26	$7.80	$20.85	$0.00	$59.91
3	75	$33.49	$7.80	$20.85	$0.00	$62.14
4	80	$35.72	$7.80	$20.85	$0.00	$64.37
5	85	$37.95	$7.80	$20.85	$0.00	$66.60
6	90	$40.19	$7.80	$20.85	$0.00	$68.84

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.99	$7.45	$12.65	$0.00	$39.09
2	70	$22.16	$7.45	$12.65	$0.00	$42.26
3	80	$25.32	$7.45	$12.65	$0.00	$45.42
4	90	$28.49	$7.45	$12.65	$0.00	$48.59

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$19.44	$7.45	$12.65	$0.00	$39.54
2	70	$22.68	$7.45	$12.65	$0.00	$42.78
3	80	$25.92	$7.45	$12.65	$0.00	$46.02
4	90	$29.16	$7.45	$12.65	$0.00	$49.26

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2015	$31.35	$7.45	$12.60	$0.00	$51.40
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$38.78	$10.18	$17.78	$0.00	$66.74
	02/01/2017	$39.24	$10.18	$17.78	$0.00	$67.20

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.39	$10.18	$17.78	$0.00	$47.35
2	60	$23.27	$10.18	$17.78	$0.00	$51.23
3	70	$27.15	$10.18	$17.78	$0.00	$55.11
4	80	$31.02	$10.18	$17.78	$0.00	$58.98
5	90	$34.90	$10.18	$17.78	$0.00	$62.86

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.62	$10.18	$17.78	$0.00	$47.58
2	60	$23.54	$10.18	$17.78	$0.00	$51.50
3	70	$27.47	$10.18	$17.78	$0.00	$55.43
4	80	$31.39	$10.18	$17.78	$0.00	$59.35
5	90	$35.32	$10.18	$17.78	$0.00	$63.28

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$50.80	$10.18	$19.22	$0.00	$80.20
	02/01/2017	$51.37	$10.18	$19.22	$0.00	$80.77

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

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.40	$10.18	$19.22	$0.00	$54.80
2	60	$30.48	$10.18	$19.22	$0.00	$59.88
3	70	$35.56	$10.18	$19.22	$0.00	$64.96
4	80	$40.64	$10.18	$19.22	$0.00	$70.04
5	90	$45.72	$10.18	$19.22	$0.00	$75.12

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.69	$10.18	$19.22	$0.00	$55.09
2	60	$30.82	$10.18	$19.22	$0.00	$60.22
3	70	$35.96	$10.18	$19.22	$0.00	$65.36
4	80	$41.10	$10.18	$19.22	$0.00	$70.50
5	90	$46.23	$10.18	$19.22	$0.00	$75.63

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	04/01/2015	$37.64	$9.80	$16.21	$0.00	$63.65

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$20.70	$9.80	$4.48	$0.00	$34.98
2	65	$24.47	$9.80	$13.36	$0.00	$47.63
3	75	$28.23	$9.80	$14.18	$0.00	$52.21
4	85	$31.99	$9.80	$14.99	$0.00	$56.78

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$22.41	$10.00	$15.15	$0.00	$47.56
	12/01/2016	$23.06	$10.00	$15.15	$0.00	$48.21
	06/01/2017	$23.57	$10.00	$15.15	$0.00	$48.72
	12/01/2017	$24.09	$10.00	$15.15	$0.00	$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$26.29	$10.00	$15.15	$0.00	$51.44
	12/01/2016	$27.04	$10.00	$15.15	$0.00	$52.19
	06/01/2017	$27.64	$10.00	$15.15	$0.00	$52.79
	12/01/2017	$28.25	$10.00	$15.15	$0.00	$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2016	$50.46	$7.85	$16.10	$0.00	$74.41
	01/01/2017	$51.41	$7.85	$16.10	$0.00	$75.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.23	$7.85	$0.00	$0.00	$33.08
2	55	$27.75	$7.85	$3.66	$0.00	$39.26
3	60	$30.28	$7.85	$3.99	$0.00	$42.12
4	65	$32.80	$7.85	$4.32	$0.00	$44.97
5	70	$35.32	$7.85	$14.11	$0.00	$57.28
6	75	$37.85	$7.85	$14.44	$0.00	$60.14
7	80	$40.37	$7.85	$14.77	$0.00	$62.99
8	90	$45.41	$7.85	$15.44	$0.00	$68.70

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.71	$7.85	$0.00	$0.00	$33.56
2	55	$28.28	$7.85	$3.66	$0.00	$39.79
3	60	$30.85	$7.85	$3.99	$0.00	$42.69
4	65	$33.42	$7.85	$4.32	$0.00	$45.59
5	70	$35.99	$7.85	$14.11	$0.00	$57.95
6	75	$38.56	$7.85	$14.44	$0.00	$60.85
7	80	$41.13	$7.85	$14.77	$0.00	$63.75
8	90	$46.27	$7.85	$15.44	$0.00	$69.56

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2016	$41.36	$7.85	$16.10	$0.00	$65.31
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2017	$42.31	$7.85	$16.10	$0.00	$66.26

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.68	$7.85	$0.00	$0.00	$28.53
2	55	$22.75	$7.85	$3.66	$0.00	$34.26
3	60	$24.82	$7.85	$3.99	$0.00	$36.66
4	65	$26.88	$7.85	$4.32	$0.00	$39.05
5	70	$28.95	$7.85	$14.11	$0.00	$50.91
6	75	$31.02	$7.85	$14.44	$0.00	$53.31
7	80	$33.09	$7.85	$14.77	$0.00	$55.71
8	90	$37.22	$7.85	$15.44	$0.00	$60.51

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.16	$7.85	$0.00	$0.00	$29.01
2	55	$23.27	$7.85	$3.66	$0.00	$34.78
3	60	$25.39	$7.85	$3.99	$0.00	$37.23
4	65	$27.50	$7.85	$4.32	$0.00	$39.67
5	70	$29.62	$7.85	$14.11	$0.00	$51.58
6	75	$31.73	$7.85	$14.44	$0.00	$54.02
7	80	$33.85	$7.85	$14.77	$0.00	$56.47
8	90	$38.08	$7.85	$15.44	$0.00	$61.37

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2016	$39.42	$7.85	$16.10	$0.00	$63.37
	01/01/2017	$40.37	$7.85	$16.10	$0.00	$64.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.71	$7.85	$0.00	$0.00	$27.56
2	55	$21.68	$7.85	$3.66	$0.00	$33.19
3	60	$23.65	$7.85	$3.99	$0.00	$35.49
4	65	$25.62	$7.85	$4.32	$0.00	$37.79
5	70	$27.59	$7.85	$14.11	$0.00	$49.55
6	75	$29.57	$7.85	$14.44	$0.00	$51.86
7	80	$31.54	$7.85	$14.77	$0.00	$54.16
8	90	$35.48	$7.85	$15.44	$0.00	$58.77

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.19	$7.85	$0.00	$0.00	$28.04
2	55	$22.20	$7.85	$3.66	$0.00	$33.71
3	60	$24.22	$7.85	$3.99	$0.00	$36.06
4	65	$26.24	$7.85	$4.32	$0.00	$38.41
5	70	$28.26	$7.85	$14.11	$0.00	$50.22
6	75	$30.28	$7.85	$14.44	$0.00	$52.57
7	80	$32.30	$7.85	$14.77	$0.00	$54.92
8	90	$36.33	$7.85	$15.44	$0.00	$59.62

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 2* For Apprentice rates see "Apprentice- LABORER"	06/01/2016	$31.65	$7.45	$12.65	$0.00	$51.75
	12/01/2016	$32.40	$7.45	$12.65	$0.00	$52.50
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2016	$39.96	$7.85	$16.10	$0.00	$63.91
	01/01/2017	$40.91	$7.85	$16.10	$0.00	$64.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.98	$7.85	$0.00	$0.00	$27.83
2	55	$21.98	$7.85	$3.66	$0.00	$33.49
3	60	$23.98	$7.85	$3.99	$0.00	$35.82
4	65	$25.97	$7.85	$4.32	$0.00	$38.14
5	70	$27.97	$7.85	$14.11	$0.00	$49.93
6	75	$29.97	$7.85	$14.44	$0.00	$52.26
7	80	$31.97	$7.85	$14.77	$0.00	$54.59
8	90	$35.96	$7.85	$15.44	$0.00	$59.25

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.46	$7.85	$0.00	$0.00	$28.31
2	55	$22.50	$7.85	$3.66	$0.00	$34.01
3	60	$24.55	$7.85	$3.99	$0.00	$36.39
4	65	$26.59	$7.85	$4.32	$0.00	$38.76
5	70	$28.64	$7.85	$14.11	$0.00	$50.60
6	75	$30.68	$7.85	$14.44	$0.00	$52.97
7	80	$32.73	$7.85	$14.77	$0.00	$55.35
8	90	$36.82	$7.85	$15.44	$0.00	$60.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2016	$38.02	$7.85	$16.10	$0.00	$61.97
	01/01/2017	$38.97	$7.85	$16.10	$0.00	$62.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 07/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.01	$7.85	$0.00	$0.00	$26.86
2	55	$20.91	$7.85	$3.66	$0.00	$32.42
3	60	$22.81	$7.85	$3.99	$0.00	$34.65
4	65	$24.71	$7.85	$4.32	$0.00	$36.88
5	70	$26.61	$7.85	$14.11	$0.00	$48.57
6	75	$28.52	$7.85	$14.44	$0.00	$50.81
7	80	$30.42	$7.85	$14.77	$0.00	$53.04
8	90	$34.22	$7.85	$15.44	$0.00	$57.51

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.49	$7.85	$0.00	$0.00	$27.34
2	55	$21.43	$7.85	$3.66	$0.00	$32.94
3	60	$23.38	$7.85	$3.99	$0.00	$35.22
4	65	$25.33	$7.85	$4.32	$0.00	$37.50
5	70	$27.28	$7.85	$14.11	$0.00	$49.24
6	75	$29.23	$7.85	$14.44	$0.00	$51.52
7	80	$31.18	$7.85	$14.77	$0.00	$53.80
8	90	$35.07	$7.85	$15.44	$0.00	$58.36

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2012	$30.28	$9.07	$8.00	$0.00	$47.35
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2015	$42.04	$9.80	$19.23	$0.00	$71.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.02	$9.80	$19.23	$0.00	$50.05
2	60	$25.22	$9.80	$19.23	$0.00	$54.25
3	70	$29.43	$9.80	$19.23	$0.00	$58.46
4	75	$31.53	$9.80	$19.23	$0.00	$60.56
5	80	$33.63	$9.80	$19.23	$0.00	$62.66
6	80	$33.63	$9.80	$19.23	$0.00	$62.66
7	90	$37.84	$9.80	$19.23	$0.00	$66.87
8	90	$37.84	$9.80	$19.23	$0.00	$66.87

Notes:

Apprentice to Journeyworker Ratio:1:3

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.08	$9.70	$7.50	$0.00	$37.28
2	45	$22.59	$9.70	$18.14	$0.00	$50.43
3	60	$30.11	$9.70	$18.14	$0.00	$57.95
4	70	$35.13	$9.70	$18.14	$0.00	$62.97
5	80	$40.15	$9.70	$18.14	$0.00	$67.99

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.48	$9.70	$7.50	$0.00	$37.68
2	45	$23.04	$9.70	$18.14	$0.00	$50.88
3	60	$30.71	$9.70	$18.14	$0.00	$58.55
4	70	$35.83	$9.70	$18.14	$0.00	$63.67
5	80	$40.95	$9.70	$18.14	$0.00	$68.79

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2016	$51.69	$11.32	$15.46	$0.00	$78.47
	03/01/2017	$52.69	$11.32	$15.46	$0.00	$79.47

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.09	$11.32	$5.74	$0.00	$35.15
2	40	$20.68	$11.32	$6.49	$0.00	$38.49
3	55	$28.43	$11.32	$8.73	$0.00	$48.48
4	65	$33.60	$11.32	$10.23	$0.00	$55.15
5	75	$38.77	$11.32	$11.72	$0.00	$61.81

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$18.44	$11.32	$5.74	$0.00	$35.50
2	40	$21.08	$11.32	$6.49	$0.00	$38.89
3	55	$28.98	$11.32	$8.73	$0.00	$49.03
4	65	$34.25	$11.32	$10.23	$0.00	$55.80
5	75	$39.52	$11.32	$11.72	$0.00	$62.56

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$58.50 Step5 with lic$65.36

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	09/01/2016	$50.19	$9.70	$18.14	$0.00	$78.03
	03/01/2017	$51.19	$9.70	$18.14	$0.00	$79.03
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
	12/01/2016	$33.40	$7.45	$12.65	$0.00	$53.50
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$30.40	$10.00	$15.15	$0.00	$55.55
	12/01/2016	$31.27	$10.00	$15.15	$0.00	$56.42
	06/01/2017	$31.96	$10.00	$15.15	$0.00	$57.11
	12/01/2017	$32.65	$10.00	$15.15	$0.00	$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER *TEAMSTERS LOCAL 42*	05/01/2016	$24.15	$8.49	$10.68	$0.00	$43.32
	04/30/2017	$24.15	$8.49	$11.07	$0.00	$43.71
	05/01/2017	$24.21	$8.49	$11.54	$0.00	$44.24
	04/30/2018	$24.21	$8.49	$11.96	$0.00	$44.66
	05/01/2018	$24.24	$8.49	$12.46	$0.00	$45.19
	04/30/2019	$24.24	$8.49	$12.92	$0.00	$45.65
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work) *CARPENTERS -ZONE 2 (Residential Wood)*	04/01/2015	$25.25	$9.80	$16.82	$0.00	$51.87
RESIDENTIAL WOOD FRAME CARPENTER ** ** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement.*CARPENTERS -ZONE 2 (Residential Wood)*	04/01/2015	$25.30	$7.00	$6.31	$0.00	$38.61

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Apprentice - *CARPENTER (Residential Wood Frame) - Zone 2*

Effective Date - 04/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.18	$7.00	$0.00	$0.00	$22.18
2	60	$15.18	$7.00	$0.00	$0.00	$22.18
3	65	$16.45	$7.00	$6.31	$0.00	$29.76
4	70	$17.71	$7.00	$6.31	$0.00	$31.02
5	75	$18.98	$7.00	$6.31	$0.00	$32.29
6	80	$20.24	$7.00	$6.31	$0.00	$33.55
7	85	$21.51	$7.00	$6.31	$0.00	$34.82
8	90	$22.77	$7.00	$6.31	$0.00	$36.08

Notes:

Apprentice to Journeyworker Ratio:1:5

RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2016	$41.11	$11.00	$13.00	$0.00	$65.11
	02/01/2017	$42.26	$11.00	$13.00	$0.00	$66.26
	08/01/2017	$43.36	$11.00	$13.00	$0.00	$67.36
	02/01/2018	$44.51	$11.00	$13.00	$0.00	$68.51
	08/01/2018	$45.61	$11.00	$13.00	$0.00	$69.61
	02/01/2019	$46.76	$11.00	$13.00	$0.00	$70.76

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.56	$11.00	$3.44	$0.00	$35.00
2	60	$24.67	$11.00	$13.00	$0.00	$48.67
3	65	$26.72	$11.00	$13.00	$0.00	$50.72
4	75	$30.83	$11.00	$13.00	$0.00	$54.83
5	85	$34.94	$11.00	$13.00	$0.00	$58.94

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.13	$11.00	$3.44	$0.00	$35.57
2	60	$25.36	$11.00	$13.00	$0.00	$49.36
3	65	$27.47	$11.00	$13.00	$0.00	$51.47
4	75	$31.70	$11.00	$13.00	$0.00	$55.70
5	85	$35.92	$11.00	$13.00	$0.00	$59.92

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.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2016	$41.36	$11.00	$13.00	$0.00	$65.36
	02/01/2017	$42.51	$11.00	$13.00	$0.00	$66.51
	08/01/2017	$43.61	$11.00	$13.00	$0.00	$67.61
	02/01/2018	$44.76	$11.00	$13.00	$0.00	$68.76
	08/01/2018	$45.86	$11.00	$13.00	$0.00	$69.86
	02/01/2019	$47.01	$11.00	$13.00	$0.00	$71.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	11/01/2016	$43.40	$10.70	$23.07	$2.32	$79.49
	02/01/2017	$44.50	$10.70	$23.07	$2.32	$80.59
	08/01/2017	$45.60	$10.70	$23.07	$2.32	$81.69
	02/01/2018	$46.75	$10.70	$23.07	$2.32	$82.84

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 11/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.36	$10.70	$5.24	$0.00	$33.30
2	40	$17.36	$10.70	$5.24	$0.00	$33.30
3	45	$19.53	$10.70	$10.31	$1.22	$41.76
4	45	$19.53	$10.70	$10.31	$1.22	$41.76
5	50	$21.70	$10.70	$11.21	$1.31	$44.92
6	50	$21.70	$10.70	$11.46	$1.32	$45.18
7	60	$26.04	$10.70	$13.02	$1.49	$51.25
8	65	$28.21	$10.70	$13.93	$1.59	$54.43
9	75	$32.55	$10.70	$15.74	$1.77	$60.76
10	85	$36.89	$10.70	$17.05	$1.94	$66.58

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$17.80	$10.70	$5.24	$0.00	$33.74
2	40	$17.80	$10.70	$5.24	$0.00	$33.74
3	45	$20.03	$10.70	$10.31	$1.24	$42.28
4	45	$20.03	$10.70	$10.31	$1.24	$42.28
5	50	$22.25	$10.70	$11.21	$1.32	$45.48
6	50	$22.25	$10.70	$11.46	$1.33	$45.74
7	60	$26.70	$10.70	$13.02	$1.51	$51.93
8	65	$28.93	$10.70	$13.93	$1.61	$55.17
9	75	$33.38	$10.70	$15.74	$1.79	$61.61
10	85	$37.83	$10.70	$17.05	$1.97	$67.55

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR *PAINTERS LOCAL 35 - ZONE 2*	06/01/2013	$25.81	$7.07	$7.05	$0.00	$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SIGN ERECTOR - Local 35 Zone 2*

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$12.91	$7.07	$0.00	$0.00	$19.98
2	55	$14.20	$7.07	$2.45	$0.00	$23.72
3	60	$15.49	$7.07	$2.45	$0.00	$25.01
4	65	$16.78	$7.07	$2.45	$0.00	$26.30
5	70	$18.07	$7.07	$7.05	$0.00	$32.19
6	75	$19.36	$7.07	$7.05	$0.00	$33.48
7	80	$20.65	$7.07	$7.05	$0.00	$34.77
8	85	$21.94	$7.07	$7.05	$0.00	$36.06
9	90	$23.23	$7.07	$7.05	$0.00	$37.35

Notes:
Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.44	$10.91	$10.08	$0.00	$53.43
	12/01/2016	$32.44	$10.91	$10.89	$0.00	$54.24
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.73	$10.91	$10.08	$0.00	$53.72
	12/01/2016	$32.73	$10.91	$10.89	$0.00	$54.53
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	10/01/2016	$55.48	$8.52	$17.05	$0.00	$81.05
	03/01/2017	$56.48	$8.52	$17.05	$0.00	$82.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 10/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.42	$8.52	$8.55	$0.00	$36.49
2	40	$22.19	$8.52	$8.55	$0.00	$39.26
3	45	$24.97	$8.52	$8.55	$0.00	$42.04
4	50	$27.74	$8.52	$8.55	$0.00	$44.81
5	55	$30.51	$8.52	$8.55	$0.00	$47.58
6	60	$33.29	$8.52	$10.05	$0.00	$51.86
7	65	$36.06	$8.52	$10.05	$0.00	$54.63
8	70	$38.84	$8.52	$10.05	$0.00	$57.41
9	75	$41.61	$8.52	$10.05	$0.00	$60.18
10	80	$44.38	$8.52	$10.05	$0.00	$62.95

Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$19.77	$8.52	$8.55	$0.00	$36.84
2	40	$22.59	$8.52	$8.55	$0.00	$39.66
3	45	$25.42	$8.52	$8.55	$0.00	$42.49
4	50	$28.24	$8.52	$8.55	$0.00	$45.31
5	55	$31.06	$8.52	$8.55	$0.00	$48.13
6	60	$33.89	$8.52	$10.05	$0.00	$52.46
7	65	$36.71	$8.52	$10.05	$0.00	$55.28
8	70	$39.54	$8.52	$10.05	$0.00	$58.11
9	75	$42.36	$8.52	$10.05	$0.00	$60.93
10	80	$45.18	$8.52	$10.05	$0.00	$63.75

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

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2016	$34.63	$13.00	$14.55	$0.00	$62.18

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$13.85	$13.00	$0.42	$0.00	$27.27
2	40	$13.85	$13.00	$0.42	$0.00	$27.27
3	45	$15.58	$13.00	$11.52	$0.00	$40.10
4	45	$15.58	$13.00	$11.52	$0.00	$40.10
5	50	$17.32	$13.00	$11.79	$0.00	$42.11
6	55	$19.05	$13.00	$12.06	$0.00	$44.11
7	60	$20.78	$13.00	$12.34	$0.00	$46.12
8	65	$22.51	$13.00	$12.62	$0.00	$48.13
9	70	$24.24	$13.00	$12.90	$0.00	$50.14
10	75	$25.97	$13.00	$13.17	$0.00	$52.14

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2016	$49.70	$10.18	$19.22	$0.00	$79.10
	02/01/2017	$50.27	$10.18	$19.22	$0.00	$79.67

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

Effective Date - 08/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.85	$10.18	$19.22	$0.00	$54.25
2	60	$29.82	$10.18	$19.22	$0.00	$59.22
3	70	$34.79	$10.18	$19.22	$0.00	$64.19
4	80	$39.76	$10.18	$19.22	$0.00	$69.16
5	90	$44.73	$10.18	$19.22	$0.00	$74.13

Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.14	$10.18	$19.22	$0.00	$54.54
2	60	$30.16	$10.18	$19.22	$0.00	$59.56
3	70	$35.19	$10.18	$19.22	$0.00	$64.59
4	80	$40.22	$10.18	$19.22	$0.00	$69.62
5	90	$45.24	$10.18	$19.22	$0.00	$74.64

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$37.20	$7.45	$14.00	$0.00	$58.65
	12/01/2016	$38.20	$7.45	$14.00	$0.00	$59.65

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*	06/01/2016	$35.92	$7.45	$14.00	$0.00	$57.37
	12/01/2016	$36.92	$7.45	$14.00	$0.00	$58.37
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2016	$35.80	$7.45	$14.00	$0.00	$57.25
	12/01/2016	$36.80	$7.45	$14.00	$0.00	$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$43.81	$10.00	$15.15	$0.00	$68.96
	12/01/2016	$45.04	$10.00	$15.15	$0.00	$70.19
	06/01/2017	$46.03	$10.00	$15.15	$0.00	$71.18
	12/01/2017	$47.02	$10.00	$15.15	$0.00	$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$33.02	$10.91	$10.08	$0.00	$54.01
	12/01/2016	$33.02	$10.91	$10.89	$0.00	$54.82
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2016	$48.08	$7.45	$14.40	$0.00	$69.93
	12/01/2016	$49.08	$7.45	$14.40	$0.00	$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2016	$50.08	$7.45	$14.40	$0.00	$71.93
	12/01/2016	$51.08	$7.45	$14.40	$0.00	$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2016	$40.15	$7.45	$14.40	$0.00	$62.00
	12/01/2016	$41.15	$7.45	$14.40	$0.00	$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2016	$42.15	$7.45	$14.40	$0.00	$64.00
	12/01/2016	$43.15	$7.45	$14.40	$0.00	$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2016	$32.44	$10.91	$10.08	$0.00	$53.43
	12/01/2016	$32.44	$10.91	$10.89	$0.00	$54.24
WAGON DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2016	$31.90	$7.45	$12.65	$0.00	$52.00
	12/01/2016	$32.65	$7.45	$12.65	$0.00	$52.75
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2016	$44.23	$10.00	$15.15	$0.00	$69.38
	12/01/2016	$45.48	$10.00	$15.15	$0.00	$70.63
	06/01/2017	$46.48	$10.00	$15.15	$0.00	$71.63
	12/01/2017	$47.48	$10.00	$15.15	$0.00	$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2016	$51.69	$11.32	$15.46	$0.00	$78.47
	03/01/2017	$52.69	$11.32	$15.46	$0.00	$79.47
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$26.61	$7.50	$1.80	$0.00	$35.91
	09/03/2017	$27.14	$7.75	$1.81	$0.00	$36.70
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$37.70	$7.50	$8.87	$0.00	$54.07
	09/03/2017	$38.45	$7.75	$9.53	$0.00	$55.73
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$31.05	$7.50	$8.89	$0.00	$47.44
	09/03/2017	$31.66	$7.75	$9.44	$0.00	$48.85
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$37.70	$7.50	$12.95	$0.00	$58.15
	09/03/2017	$38.45	$7.75	$13.61	$0.00	$59.81
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$33.26	$7.50	$9.63	$0.00	$50.39
	09/03/2017	$33.92	$7.75	$10.21	$0.00	$51.88
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$24.39	$7.50	$1.73	$0.00	$33.62
	09/03/2017	$24.88	$7.75	$1.75	$0.00	$34.38
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/28/2016	$19.96	$7.50	$1.60	$0.00	$29.06
	09/03/2017	$20.35	$7.75	$1.61	$0.00	$29.71
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/28/2016	$44.35	$7.50	$15.83	$0.00	$67.68
	09/03/2017	$45.23	$7.75	$16.61	$0.00	$69.59

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/28/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$26.61	$7.50	$3.30	$0.00	$37.41
2	65	$28.83	$7.50	$3.36	$0.00	$39.69
3	70	$31.05	$7.50	$3.43	$0.00	$41.98
4	75	$33.26	$7.50	$5.00	$0.00	$45.76
5	80	$35.48	$7.50	$5.06	$0.00	$48.04
6	85	$37.70	$7.50	$5.13	$0.00	$50.33
7	90	$39.92	$7.50	$7.20	$0.00	$54.62

Effective Date - 09/03/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$27.14	$7.75	$3.31	$0.00	$38.20
2	65	$29.40	$7.75	$3.38	$0.00	$40.53
3	70	$31.66	$7.75	$3.45	$0.00	$42.86
4	75	$33.92	$7.75	$5.02	$0.00	$46.69
5	80	$36.18	$7.75	$5.09	$0.00	$49.02
6	85	$38.45	$7.75	$5.15	$0.00	$51.35
7	90	$40.71	$7.75	$7.22	$0.00	$55.68

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$28.98	$4.25	$3.12	$0.00	$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/01/2016	$27.31	$4.25	$3.07	$0.00	$34.63
TREE TRIMMER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$18.51	$3.55	$0.00	$0.00	$22.06

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.

TREE TRIMMER GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$16.32	$3.55	$0.00	$0.00	$19.87

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.

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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WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

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

Each such contractor or subcontractor shall furnish to the awarding authority directly within 15 days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form.

STATEMENT OF COMPLIANCE

_____, 20_____

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

do hereby state:

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

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

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

Signature_____
Title _____

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SECTION 00 86 00
LIST OF DRAWINGS

Drawing Number	**Title**
Cover Sheet	
Plumbing	
P0.00	PLUMBING LEGENDS, NOTES, ABBREVIATIONS AND DETAILS
PD2.00	PLUMBING BOILER ROOM DEMOLITION PLAN - PHASE 1
PD2.01	PLUMBING BOILER ROOM DEMOLITION PLNA - PHASE 2
P2.00	PLUMBING BOILER ROOM NEW WORK PLAN - PHASE 1
HVAC	
H0.00	HVAC LEGENDS, NOTES AND ABBREVIATIONS
H0.01	HVAC BOILER ROOM EQUIPMENT LAYOUT
HD2.01	HVAC BOILER ROOM DEMOLITION PLAN - PHASE 1
HD2.02	HVAC BOILER ROOM DEMOLITION PLAN - PHASE 2
H2.01	HVAC BOILER ROOM BREECHING NEW WORK PLAN - PHASE 1
H2.02	HVAC BOILER ROOM PIPING NEW WORK PLAN - PHASE 1
H2.03	HVAC BOILER ROOM BREECHING NEW WORK PLAN - PHASE 2
H2.04	HVAC BOILER ROOM PIPING NEW WORK PLAN - PHASE 2
H6.00	HVAC CONTROLS
H7.00	HVAC DETAILS
H8.00	HVAC SCHEDULES
Electrical	
E0.00	ELECTRICAL LEGENDS, NOTES AND ABBREVIATIONS
ED2.00	ELECTRICAL POWER BOILER ROOM DEMOLITION PLAN
E2.00	ELECTRICAL POWER BOILER ROOM NEW WORK PLAN
E9.00	ELECTRICAL DETAILS & SCHEDULES

SWAMPSCOTT PUBLIC SCHOOLS

Superintendent's Office

MEMORANDUM

To: All Employees, Field Trip Volunteers(s), Student Teachers, Student Observers, Pre-Practicum Students & Coaches, After School Program Teacher, and Substitutes

From: Pamela R. H. Angelakis, M.A., M.Ed.

Subject: Background Checks Law (SAFIS/Fingerprinting)

If you hold a DESE license (licensed educators and specialists) the fee is $55 (regardless of whether or not you are working under your license, if you have a DESE license you are required to pay the $55 fee). If you have a pending application/license, you must also pay the $55 fee.

If you do not hold a DESE license the fee for fingerprinting is $35.

TO SCHEDULE A FINGERPRINTING APPOINTMENT

MorphoTrust, our fingerprinting vendor, continues to add locations and hours. Consult the MorphoTrust registration website for the latest information.
http://www.identogo.com/BookanAppointment.aspx or call 1-866-349-8130

You will be required to provide the Swampscott Public School Provider ID Code: 02910000
You may provide up to 10 district Provider ID Codes to eliminate the need to pay the fee multiple times. This should be done at the time you schedule your fingerprint appointment.

Results will remain confidential and be filed in the Superintendent's Office. You will only be contacted if results were found unsuitable.

Other surrounding provider ID codes:

Beverly	00300000	Peabody	02290000
Danvers	00710000	Revere	02480000
Lynn	01630000	Salem	02580000
Lynnfield	01640000	Saugus	02620000
Marblehead	01680000		

To find other districts please go to: http://profiles.doe.mass.edu/

For more information please visit:
The Act: http://www.malegislature.gov/Laws/SessionLaws/Acts/2012/Chapter459
FAQs: http://www.mass.gov/edu/birth-grade-12/early-education-and-care/laws-regulations-and-policies/background-records-check-regulations-and-policies/frequently-asked-questions-regarding-background-checks.html

SAFIS Info.: http://www.mass.gov/courts/case-legal-res/law-lib/laws-by-subj/about/cori.html#CorrectingACriminalRecord

For general questions about the new law and its requirements, please call the Executive Office of Education at (617) 979-8340.

Updated: 28-Oct-14, 16-Mar-2015; 2-Sept-2015; 19-Nov-2015

DIVISION 1

SECTION 01000

GENERAL REQUIREMENTS

01010 SUMMARY OF WORK

1.01 CONTRACT DOCUMENTS

The general provisions of the Contract Documents and General Conditions apply to the work specified in this section.

1.02 SPECIFICATION ARRANGEMENT

Titles to and arrangements of sections and paragraphs in these specifications are used merely for convenience and shall not be taken as a correct or complete segregation of the several categories of materials, equipment and labor, nor as an attempt to outline or define jurisdictional procedures.

1.03 QUALIFIED BIDDERS

Qualified Bidders shall require DCAMM Certification in the category of Mechanical Systems. The terms Prime, General or Mechanical shall be interchangeable. The Prime Contractor shall carry the cost of all associated trades in its Bid. The Prime Contractor shall function as the General Contractor for the project.

1.04 INTENT

The entire work provided for in these technical specifications and on the Drawings shall be constructed and finished in every respect in a good workmanlike and substantial manner. All parts necessary for the proper and complete execution of the work whether the same may have been specifically mentioned or not, or indicated in a manner corresponding with the rest of the work shall be provided as if the same were particularly described and specifically provided for herein. It is not intended that the Drawings shall show every detailed piece of material or equipment, but such parts and pieces as may be in accordance with the best practices and regulatory requirements, even though not shown, shall be furnished and installed. All materials and equipment shall be new, unless specifically stated otherwise in these Contract Documents.

1.05 SCOPE

The work required by these specifications shall include furnishing all labor, skill, supervision, tools, construction plant, equipment and materials and performing all operations necessary for the properly completed contract work as shown on the Drawings, as mentioned in these specifications, and as evidently required, to the complete satisfaction of the Engineer.

All additional costs for premium time and late shifts shall be included by the contractor and sub contractor in their bid.

1.06 GENERAL DESCRIPTION OF WORK:

The work in general includes, but is not limited to: This project, in general, includes the replacement of fourteen (14) gas fired, cast iron steam boilers with three (3) new natural gas fired steam boiler. This work includes the replacement of the boiler feed unit, breeching and stack, installation of a new combustion air louver and damper assembly and associated electrical work. Gas piping shall be extended from the recently installed natural gas service to the boiler and includes new gas booster. This project requires work be performed during heating season and includes requirements for a temporary boiler

and temporary electrical service. Also required, is the reconfiguring of the existing domestic water heater and mixing valve piping.

1.07 PRE-CONSTRUCTION CONFERENCE

1. Within ten days of the contract execution and prior to the start of construction there will be a pre-construction meeting between the Contractor, representatives of the Owner and the Engineer to discuss methods of construction and completion of the project.
2. Representatives of the following shall be required to attend this conference:
   a. Owner
   b. Engineer
   c. General Contractor
   d. All Sub-Contractors
3. Contractors shall make specified pre-construction submissions including the following, if not already submitted:
   a. Typed list of sub-contractors, with addresses and telephone numbers, and the name of principal contract.
   b. Certificate of Insurance
   c. Performance and Payment Bonds
   d. Construction Schedule
   e. Schedule of Values
   f. Schedule of Monthly Construction Payments
4. Agenda will include the following items:
   a. Tentative construction schedule
   b. Critical work sequencing
   c. Designation of responsible personnel
   d. Submittal of shop drawings, project data and samples
   e. Processing applications for payment
   f. Procedures for maintenance of record documents
   g. Procedures for field changes, change estimates, change orders, etc.
   h. Use of premises
   i. Location and maintenance of temporary storage buildings, field offices, etc.
   j. Major equipment deliveries and priorities
   k. Site and building security procedures
   l. Procedures for submitting Prevailing Wage Rates sheets.

01011 CONTRACT INCLUDES (LIST OF DRAWINGS)

PLUMBING

PO.OO PLUMBING - LEGENDS, NOTES, ABBREVIATIONS & SCHEDULES

PD2.00	PLUMBING - BOILER ROOM DEMOLITION – PHASE 1
PD2.01	PLUMBING - BOILER ROOM DEMOLITION – PHASE 2
P2.00	PLUMBING BOILER ROOM NEW WORK PLAN – PHASE 1
P2.01	PLUMBING BOILER ROOM NEW WORK PLAN – PHASE 2

HVAC

HO.OO	HVAC LEGENDS, NOTES, & ABBREVIATIONS
H0.01	HVAC EQUIPMENT PLAN
HD2.O1	HVAC BOILER ROOM BREECHING & PIPING DEMOLITION PLAN – PHASE 1
HD2.02	HVAC BOILER ROOM BREECHING & PIPING DEMOLITION PLAN – PHASE 2
H2.01	HVAC BOILER ROOM BREECHING NEW WORK PLAN – PHASE 1
H2.02	HVAC BOILER ROOM NEW WORK PLAN – PHASE 1
H2.03	HVAC BOILER ROOM BREECHING NEW WORK PLAN – PHASE 2
H2.04	HVAC BOILER OROM PIPING NEW WORK PLAN – PHASE 2
H6.OO	HVAC CONTROLS
H7.OO	HVAC DETAILS
H8.OO	HVAC SCHEDULES

ELECTRICAL

EO.OO	ELECTRICAL LEGENDS, NOTES, AND ABBREVIATIONS
ED2.OO	ELECTRICAL BOILER ROOM DEMOLITION PART PLAN
E2.OO	ELECTRICAL BOILER ROOM NEW WORK PART PLAN
E9.OO	ELECTRICAL DETAILS AND SCHEDULES

01012 ORDER OF AND COMPLETION OF WORK

1.01 Upon execution of the contract, the Contractor shall commence work immediately, carry it on with all reasonable and proper activity and dispatch, give all notices, take out all permits and pay all charge, fees and rates therefor, and bring the work to entire completion within the period of time specified in the contract. "Entire Completion" as herein used, shall be construed as meaning the completion of all work as called for by these specifications and the contract executed in accordance herewith and the date when such completion takes place will be decided by the Engineer.

01013 PROTECTION - IN GENERAL

1.01 The Contractor is to cover and protect his work and materials from all damage during the process of the work and deliver the whole in a clean perfect condition.

01014 CONSTRUCTION RISKS

1.01 The Contractor will understand that the materials, work in place and equipment, are

entirely at his risk, including loss by theft or fire during the construction period, and he will be held responsible and liable for its safety.

01015 SANITARY ACCOMMODATIONS

1.01 Make arrangements with the awarding authority for use of a designated toilet.

01016 UTILITIES

1.01 Water and electric power shall be available from existing sources where Contractor's use is not excessive and does not interfere with normal use of the buildings. Where existing utilities of the facilities are not adequate or cannot be used, the Contractor is responsible for providing alternative sources, the cost of which is to be included in bid price. The use of the facility's utilities shall be coordinated through the Engineer.

1.02 The Contractor shall be allowed the use of a designated toilet room and shall clean and sanitize the toilet room at the end of each work day.

1.03 The Contractor shall provide all wiring, cables, hoses, safety devices, switches, etc., necessary for the utilities used by the Contractor and remove the same upon completion.

1.04 The Contractor shall be responsible for all materials, equipment and the associated costs to provide temporary heat to the school, in the event of delays.

01017 RECORD DRAWINGS

1.01 The Contractor shall maintain at the job site, at all times, a complete and separate set of black line prints of the Drawings on which he shall mark clearly, accurately, and promptly as the work progresses, any changes in the work made by change orders or other instructions issued by the Engineer. These drawings shall be used daily to record the progress of the work by coloring in the various pipes, equipment and associated appurtenances when installed. This progress shall incorporate both the above stated changes together with all other deviations from the design, whether resulting from the job conditions encountered in the field or from any other cause. Principal dimensions of all concealed work and valve numbers shall be recorded as applicable.

1.02 The marked-up prints shall be used as a guide in determining the progress of work installed. The Engineer will inspect these prints periodically and if found to be inaccurate or incomplete, they shall be corrected immediately.

1.03 At completion of work these marked-up prints shall be the basis of the preparation of the final record drawings. Each drawing shall be marked "RECORD AS BUILT DRAWINGS" and dated when printed. Two complete and reproducible sets of as-built drawings must be submitted before final acceptance of the work. The cost of preparing the record drawings shall be borne by the Contractor.

01018 ENGINEERING (Refer to Section "220000, 230000 and 260000")

01019 OFFICE (none required)

01020 VISITATION OF SITE

1.01 All bidders shall, before submitting a bid, visit the site to familiarize themselves with existing conditions. Lack of knowledge of on-site conditions shall not be cause for changes to the contract values.

01021 DISPOSAL OF WASTE MATERIALS

1.01 The Contractor shall be responsible for the removal of all waste material and equipment from the site.

1.02 The Contractor shall be responsible for the removal of all hazardous materials, disposal to properly licensed disposal sites and transportation permits.

1.03 The Contractor shall take possession of all equipment and materials that are to be removed legally disposing of equipment and materials in accordance with all applicable federal, state and local regulations.

01022 PERSONNEL SECURITY REQUIREMENTS

1.01 The names of all managers, supervisors and workers shall be submitted for CORI checks. No one shall be permitted to enter the building without an approved background check. All workers shall wear identification badges issued by South Shore Vocational Technical High School.

01023 BUILDING SECURITY

1.01 The Owner will provide security for the building, however, it shall be the responsibility of the Contractor to secure all exit doors in the area where work is to be performed, coordinating same with the chief custodian or an assigned representative of the Owner. The Owner will not provide security or be responsible for the Contractor's property, fixtures, fittings, tools, equipment, etc.

01024 ACCESS TO BUILDING

1.01 The buildings will be opened during scheduled working hours only. Exceptions to this clause may be made by mutual agreement between the Owner and Contractor in the initial phase of the project.

01025 TEMPORARY PARKING

1.01 Coordinate with the Owner for the location of limited parking for various stages of the project.

01026 TEMPORARY STAGING STORAGE

1.01 Coordinate with the owner for the preferred location of storage and office trailers for various project stages.

01027 PUBLIC PROTECTION

1.01 While the work is in progress, erect safe barricades to effectively protect persons from injury.

1.02 Protect all ground areas where stationary equipment is placed and protect wall areas from hoisting or material conveyers.

01028 CUTTING & PATCHING

1.01 GENERAL REQUIREMENTS

a) All of the contract documents including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this Section.

1.02 WORK INCLUDED

a) The intent of this Section is to describe, in general, procedures for performance of minor alterations, minor removals, and cutting and patching including:

1) All necessary cutting, coring, drilling, grouting, and patching to fit together the several parts of the work including repairs in kind of disturbed existing surfaces.

2) Where conflicts exist between the requirements specified herein and those of the Technical Trade Sections, those of the Trade Sections shall prevail.

b) The Contractor shall be responsible for all his cutting, coring, drilling, grouting, fitting and patching of the work that may be required to make its several parts

come together properly and fit, as shown upon, or reasonably implied by, Drawings and Specifications for completed structure, and he shall make good after them as Engineer may direct.

c) Expense caused by defective or ill-timed work shall be borne by the Contractor.

1.03 CUTTING AND PATCHING OPERATIONS

a) Patch and refinish to match adjacent work in quality and appearance at locations where installed work has been installed and requires reworking to accommodate other work, or has been damaged.

b) Patch and match using skilled mechanics. The quality of patched or extended work shall be not less than that specified for new work.

c) Patch or replace any portion of a finished surface which is found to be damaged, lifted, discolored, or shows other imperfections, with matching material.

1) Provide adequate support or substrate prior to patching the finish.

2) Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.

3) When surface finish cannot be matched, refinish the entire surface to the nearest intersections.

d) Make the transition as smooth and workmanlike as possible. Patched work shall match adjacent work in texture and appearance so that the patch or transition is invisible to the naked eye at a distance of five feet.

END OF SECTION

SECTION 01 04 00

EXISTING CONDITIONS

1.01 GENERAL PROVISIONS

A. The Conditions of the Contract and other Sections of Division I, General Requirements apply to this section.

1.02 EXISTING CONDITIONS

A. Before submitting a 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 which could be discerned from visiting the site.

C. The Contractor shall report any discrepancies to the Engineer and request an interpretation.

END OF SECTION

SECTION 01 10 00

SPECIAL CONDITIONS

PART 1 - GENERAL

1.01 RESPONSIBILITY AND COMPLIANCE

A. All requirements set forth under this Section are directed to the General Contractor.

B. Be responsible for arranging for facilities as specified herein and as required for proper and expeditious prosecution of the work. Pay costs for such general services and temporary facilities, except as otherwise specified, until final acceptance of the work, and remove at completion of work.

C. Comply with applicable OSHA, state, and municipal regulations and requirements for services and facilities required under this Section, and in performance of all requirements of this Contract.

1.02 COORDINATION OF THE WORK

A. The Contractor shall coordinate all work with all adjacent work and shall cooperate with all other trades so as to facilitate general progress of the work. Each trade shall afford all other trades every reasonable opportunity for the installation of their respective work and for the storage of their materials and equipment. The Contractor shall be responsible for coordination.

B. The Contractor shall assume responsibility for the correctness and adequacy of his work. The Contractor shall be responsible for and pay for all damages done by his work or his workmen.

C. The Contractor shall cooperate with, and provide access and working area to other Owner's contractors for the performance of specific work assigned to them.

D. Execution of work for this project shall be coordinated with the owner regarding interruption of service to the building including but not limited to domestic hot water and cooking operations.

1.03 PROJECT MEETINGS

A. The Contractor will be required to meet with the Owner, Engineer and the Owner's representatives, at the site of the work, at regular intervals (minimum of one meeting every two weeks) during the course of the contract for purposes of progress review, coordination of shop schedules, sample submittals, and any other items of work requiring such coordination. The dates of such meetings shall be as established by the Engineer and mutually agreed upon by the Contractor, the Engineer, and the Owner's Representative.

1.04 EXISTING BUILDING CONDITIONS

A. Before ordering any materials or doing any work, verify all measurements and existing building conditions and be responsible for the correctness of same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the measurements indicated on the Drawings; any difference which may be found shall be submitted to the Engineer in writing for consideration before proceeding with the work.

1.05 PROTECTION OF EXISTING CONDITIONS

A. Take all proper precautions to protect the Owner and adjoining property from injury and unnecessary interference; and replace or put in good condition any existing items which are damaged or injured in carrying out the work, unless designated to permanently be removed or demolished.

B. Keep all access drives and walks clear of debris during building operations. Repair streets, drives, curbs, sidewalks, poles, and the like, where disturbed by building operation and leave them in as good condition after completion of the work as before operations started. Floors, stairwells, and corridors must be kept clean of debris and means of egress maintained.

C. Take all necessary precautions to protect the roof from damage during operations performed on the roof. Contractors shall the video survey of the existing roof and identify any existing conditions.

1.06 TESTS AND INSPECTION

A. Make, or have made, such tests and inspections on workmanship and materials as may be required by the building code, state or municipal laws, or as called for under the various SECTIONS of this Specification.

B. Bear all expense to such tests and inspections, unless otherwise specified under the various SECTIONS of the Specifications and furnish all labor, tools, instruments, water, temporary power and light, construction, and equipment necessary for these tests and inspection. Furnish records of all tests and inspections to the Engineer. Remove all temporary work, materials, and equipment upon completion of tests and inspections.

C. Where, the various SECTIONS of the Specifications, inspections and testing of materials, processes, and the like is called for, the selection of bureaus, laboratories, and/or agencies for such inspection and testing shall be subject to the approval of the Engineer.

D. Should any material or work be found, after testing or inspections, to be defective or inferior, remove and replace such material and/or work with new sound materials and/or work as approved by the Engineer, and bear all costs thereof.

E. Permits and inspections from the South Shore Vocational Technical High School will be required.

1.07 FIRE PROTECTION AND PREVENTION

A. Comply with the following minimum requirements for fire prevention:

1. Provide the services of a Town of Swampscott Firefighter during all welding/cutting operations performed within the building (i.e., demolition).

2. Provide sufficient quantity of carbon dioxide fire extinguishers in all areas of work.

3. Do not permit an accumulation of inflammable rubbish to stay in the building overnight.

4. Store no more than one gallon, in an approved safety can or sealed container, of any volatile inflammable liquid in any portion of the building.

5. Make arrangements for periodic inspection by local fire protection authorities and insurance underwriters' inspections. Cooperate with said authorities to facilitate proper inspection of the premises. Comply with all applicable laws and ordinances and with the Owner's fire prevention requirements.

6. Ensure that tarpaulins that may be used during construction of work are made of material which is resistant to fire, water, and weather, are UL approved, and comply with FS-CCC-D-746.

1.08 ACCIDENT PREVENTION

A. Comply with all federal, state and municipal recommendations and requirements for safety, and accident prevention, and those of the Associated General Contractors of America, and the American Standards Association Standard A10.2. Ensure that the field superintendent conducts regular, frequent inspections of the site for compliance with safety regulations.

B. Neither the Owner nor the Engineer shall be responsible for providing a safe working place for the Contractor, contractors, or their employees, or any individual responsible to them for the work.

1.09 WELDING AND CUTTING

A. Where electric or gas welding or cutting work is done above or within ten (10) feet of combustible material or above space that may be occupied by persons, use interposed shields of incombustible material to protect against fire damage or injury due to sparks and hot metal.

B. Place tank supplying gases for gas welding or cutting at no greater distance from the work than is necessary for safety, securely fastened and maintained in an upright position where practicable. Such tanks, when stored for use, shall be remote from any combustible material and free from exposure to the rays of the sun or high temperatures.

C. Maintain suitable fire extinguishing equipment near all welding and cutting operations. When operations cease for the noon hour or at the end of the day, thoroughly wet down the surroundings adjacent to welding and cutting operations.

D. Station a workman equipped with suitable fire extinguishing equipment near welding and cutting operations to see that sparks do not lodge in floor cracks or pass through floor or wall openings or lodge in any combustible material. Keep the workman at the source of work which offers special hazards for thirty (30) minutes after the job is completed to make sure that smoldering fires have not been started.

E. Place a qualified electrician in charge of installing and repairing electric or arc welding equipment.

F. All welding and cuttings shall be performed by certified welders.

1.10 OVERLOADING

A. Do not permit materials and fabricated work to be stacked on, or be transported over, floor and roof construction that would stress any of said construction beyond the designed live loads.

1.11 RUBBISH REMOVAL

A. Ensure that each workman engaged upon the work bears his full responsibility for cleaning up during and immediately upon completion of his work, and removes all rubbish, waste, tools, equipment, and appurtenances caused by and used in the execution of his work, but this shall in no way be construed to relieve the Contractor of his primary responsibility for maintaining the building and site clean and free of debris, leaving all work in a clean and proper condition satisfactory to the Engineer and/or Owner.

B. Do not permit rubbish to be thrown from the windows of the building.

C. Immediately after unpacking, all packing materials, case lumber, excelsior, wrapping or other rubbish, flammable or otherwise, shall be collected and removed from the building and premises.

1.12 BLASTING

A. No blasting will be permitted.

1.13 WORK AREAS, STORAGE, ACCESS, AND PARKING

A. The Contractor's work areas shall be as designated on the Drawings, and shall be strictly adhered to. Access to the existing building shall be kept free of all obstructions at all times. Assume full responsibility for trespass on and/or damage to other property by any person employed on the project.

B. A storage area for construction materials will be designated for the use of the Contractor. Storage of materials beyond the designated area will not be permitted.

C. Vehicular access to the site, and parking for employees' vehicles shall be restricted only to the specific areas designated by the Owner.

1.14 TEMPORARY SCAFFOLDING AND CONVEYANCES

A. Furnish, install, maintain, remove and pay for all temporary staging and planking, ladders, hoisting (including operator), rigging, and safety devices for all trades.

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

C. Permit no materials to be passed through the finished openings of exterior walls, without first providing protection to the opening thereof of a type as approved by the Engineer. Be responsible, and bear all costs, for repairs and/or replacement of damaged work caused thereby.

1.15 TEMPORARY PROTECTION

A. Furnish, erect, and maintain for the duration of the work period, temporary fire-retardant, dust proof coverings as required to prevent the spread of dust beyond the immediate area where work is being performed. Provide 2 layers of 6 mil poly and safety taping where required to prevent dust migration.

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

1. Maintain exit signs and power for illumination during construction. Provide temporary exit signs as required during construction.

1.16 ADVERTISING MATTER

A. Signs or advertisements will not be allowed on building enclosure or premises, unless written approval has been obtained from the Owner.

B. Advertising matter shall not appear on equipment, unless so specified. However, nameplates of a nominal size and inconspicuous nature will be permitted.

1.17 MUNICIPAL POLICE AND FIRE DEPARTMENT SERVICES

A. Make all necessary arrangements with the municipal police and fire departments in advance of times when regular off-duty, or reserve police officers or fire fighters will be needed for traffic control protection or fire watch, due to the operations performed under this Contract. Pay police officers and firemen at the prevailing wage rates in the municipality for such services. Extend the Worker's Compensation Insurance and Employer's Liability Insurance, required under the General Contract to cover police and firefighter used on the project.

1.18 USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY THE OWNER

A. The building will be occupied, for normal function thereof, during the stipulated construction period.

1.19 GLASS BREAKAGE

A. The contractor shall be responsible for all breakage of glass as a direct or indirect result of

his work or actions of his workmen, from the time the construction operations commence until the project is complete. Replace all broken glass and deliver the building with all glazing intact and clean.

1.20 DAMAGE TO EXISTING SURFACES

A. The Contractor shall be fully responsible for any damage to existing surfaces caused by the operations of this Contract, and shall correct all such damage to the Owner's satisfaction, at no additional cost to the Contract.

1.21 FINAL CLEANING

A. Before the final inspection, thoroughly clean the entire exterior and interior areas of the building where construction work has been performed, the immediate surrounding areas, and corridors, stairs, halls, storage areas, temporary offices and toilets, including the following:

1. Remove all construction facilities, debris, and rubbish from the Owner's property and legally dispose of same beyond the site limits.

2. Sweep, dust, wash, and polish all finished surfaces. This includes cleaning of the work of all finished trades where needed, whether or not cleaning for such trades is included in their respective SECTIONS.

3. Clean, wash and polish all school furnishings after being returned to classrooms from storage.

END OF SECTION

SECTION 01 23 00

ALTERNATES

1.1 SCOPE

A. This Section lists the Alternates which appear in the Contract Documents. Consult the individual sections of the detailed requirements of each Alternate.

B. Bid prices for each Alternate shall include overhead, profit, and all other expenses incidental to the Work under each Alternate.

C. The Contractor and Subcontractors shall be responsible for examining the scope of each Alternate generally defined herein and for recognizing modifications to the Work caused by the Alternates and including the cost thereof in the bid price.

D. The Contractor's alternate amount shall include the net change in cost to perform all of the work described in the Alternate.

1.2.1 LIST OF ALTERNATES

A. BacNet Internet Interface & Access to Boiler Controls.

END OF SECTION

SECTION 01 30 00

SUBMITTALS - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.01 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.

1.02 GENERAL PROCEDURES FOR SUBMITTALS

A. Timeliness - The Contractor shall transmit each submittal to the Engineer 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 Engineer in advance of the Work.

B. Sequence - The Contractor shall transmit each submittal in a sequence which will not result in the Engineer’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 Engineer. 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. Engineer's Action - The Engineer 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 "Approved" 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 “Approved as Noted” the Work may proceed provided it complies with the Engineer’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 "Revise and Resubmit" or "Disapproved" 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 Engineer'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.

1.03 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 Engineer, with the Awarding Authority written concurrence, shall consider the item equal to the Item so named or described, as provided by M.G.L. c.149.

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

D. The Contractor shall assume full responsibility for the performance of any item submitted as an "Or-Equal" and assume the costs of any changes in any Work which may be caused by such substitution.

E. Or Equal Approval Process - On the transmittal, or on a separate sheet attached to the submission, the Contractor shall direct attention to any deviations, including minor limitations and variations, from the Contract Documents.

1. The Contractor shall submit to the Engineer for consideration of any or-equal substitution a written point-by-point comparison containing the name and full particulars of the proposed product and the product named or described in the Contract Documents.

2. Such submittal shall in no event be made later than 7 calendar days prior to the incorporation of the item into the Work. In any case in which the time period specified in the Contract Documents from the Notice to Proceed to Substantial Completion is less than 7 days, this requirement can be waived by the Engineer.

3. Upon receipt of a written request for approval of an or-equal substitution, the Engineer shall investigate whether the proposed item shall be considered equal to the item named or described in the Contract Documents. Upon conclusion of the investigation, the Engineer shall promptly advise the Contractor that the item is, or is not, considered acceptable as an Or-Equal substitution. Such written notice must have the concurrence of the Administrator.

1.04 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 Engineer 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 Engineer's stamp.

E. The Contractor shall submit to the Engineer one legible, reproducible transparency and two black line prints of each shop drawing. Transparency and prints shall be mailed or delivered in roll form. Each submittal shall be accompanied by a transmittal notice.

F. When the transparency is returned by the Engineer with the stamp "Revise and Resubmit" or "Disapproved", the Contractor shall correct the original drawing or prepare a new drawing and resubmit a transparency and two prints thereof to the Engineer for approval. This procedure shall be repeated until the Engineer's approval is obtained.

G. When the transparency is returned by the Engineer with the stamp "Approved" or "Approved as Corrected", the Contractor shall provide and distribute the prints for all Contractor and Subcontractors use, and in addition submit, within 10 calendar days after approval, 4 prints to the Engineer.

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

1.05 SUBMISSION OF PRODUCT DATA

A. The Contractor shall submit 7 copies or one electronic copy as a PDF of Product Data to the Engineer. All such data shall be specific and identification of material or equipment submitted shall be clearly marked in ink. Data of general nature will not be accepted.

B. Product Data shall be accompanied by a transmittal notice and each product or product type shall have a separate cover sheet. 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 Engineer as "Disapproved or "Revise and Resubmit" shall be resubmitted in 7 copies or one electronic copy until the Engineers approval is obtained.

D. When the Product Data are acceptable, the Engineer will stamp them "Approved" or "Approved as Noted", retain 3 copies, and return 4 copies 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.

END OF SECTION

SECTION 01 31 00
SCHEDULE OF WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The Contractor, as a minimum, shall fulfill the Contract Schedule specified hereinafter.

B. Provide all necessary manpower, overtime work, materials and equipment, permits, etc., to complete the contract schedule. The building will be available as listed in Paragraph 1.03: Available Working Hours.

C. All cutting in occupied areas shall be performed during unoccupied periods.

D. A legal means of egress shall be maintained during construction at all times.

E. During fire alarm drills, the Contractor shall immediately clear the area of work and provide complete safe access through the work area. Review this procedure with the Building Department and Fire Department.

1.02 MILESTONE AND PHASING SCHEDULE

A. Milestone and Phasing Schedule as follows. These areas of the facility must be complete, operational and turned over to the owner by the dates shown.

B. The new boilers along with the mechanical and electrical systems must be operational by eighty (80) calendar days after Notice to Proceed (NTP).

C. The project shall be substantially complete within ninety-five (95) calendar days after NTP.

D. The Contractor shall perform the work during the School Sessions from December 8, 2016 through February 1, 2017 with minimal disruptions to School Operations and as directed by the School Facilities Staff.

E. All additional costs from premium time and late shifts shall be included by the contractor and sub contractors in their bid.

1.03 AVAILABLE WORK HOURS

A. Work hours are limited to Monday through Friday, 5:00 a.m. to 6:00 p.m. Any work prior to 5:00 a.m. or after 6:00 p.m. and on weekends must be coordinated through the School Facilities staff.

   a. Contractor accessing the work area/boiler rooms during School Sessions shall be with prior approval and as directed by the School Facilities staff.

B. Additional hours, including weekends, must be requested by the Contractor and approved by the Swampscott Public Schools.

END OF SECTION

SECTION 01 31 50

PROJECT MANAGEMENT AND COORDINATION

PART I - GENERAL

1.01 GENERAL PROJECT COORDINATION

A. Coordination: The Contractor is fully responsible for coordinating the Work of this Contract including scheduling, submittals, Work and other activities included in various Sections to assure efficient and orderly sequence of installation of interdependent construction elements. The Contractor is responsible for coordinating actual installed location and interface of work, and to make provisions to accommodate items scheduled for later installation.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain efficient installation with the least amount of alterations, or cuffing and patching, to completed Work.

1. The Contractor shall be responsible to uncover work completed, to install ill-timed work, at no additional cost to the Owner.

C. Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion and Owner's occupancy.

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.02 UTILITIES, MECHANICAL AND ELECTRICAL COORDINATION

A. Coordinate the Work of all Divisions.

B. Give all advance notice to public utility companies as required by law, and provide proper disposition, subject to Engineer's approval of all existing pipe lines, conduits, sewers,

drains, poles, wiring, and other utilities that in any way interfere with the Work, whether or not they are specifically shown on the Drawings.

C. Notify Owner and appropriate authorities when coming across an unknown utility line(s), and await decision as to how to dispose of same.

D. When an existing utility line must be cut and plugged or capped, moved, or relocated, or has become damaged, notify the Owner and Utility company involved, and assure the protection, support, or moving of utilities to adjust them to the new work.

E. The Contractor shall be responsible for all damage caused to existing, active utilities located within the limits of this Contract, whether or not such utilities are shown on the Drawings, including resultant damages or injuries to persons or properties.

F. Provide openings in the work for penetration of mechanical and electrical work.

1.03 COORDINATION OF CUTTING AND PATCHING

A. Cutting and patching coordination: The Contractor is responsible for coordination of all cutting and patching necessary for the completion of this Contract and for the quality and appearance of all patch Work in exposed-to-view finished materials.

B. Specialized cutting and patching: To achieve optimum results in cutting and patching of particular materials, surfaces and products, patching work shall be performed by those installers or fabricators specialized under the Sections:

C. Core drilling: The Contractor is responsible for performing core drilling in wall and roof surfaces leading to, or from, the outside of the Building.

1.04 COORDINATION DOCUMENTS

A. General: Prepare coordination drawings for areas where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Coordination Drawings include but are not necessarily limited to:

a. Mechanical equipment and piping.

b. Electrical devices.

c. Control panels.

B. Timing: Prior to fabricating materials or beginning work, supervise and direct the creation of one complete set of coordination drawings showing complete coordination and integration of work, including, but not limited to, structural, architectural, mechanical, plumbing, fire protection, elevators, and electrical disciplines.

C. Intent: Coordination drawings are for the Contractor's use during construction and are not to be construed as replacing shop drawings or record drawings. Engineer's review of submitted coordination drawings shall not relieve the Contractor from his overall responsibility for the coordination of the Work of the Contract.

D. Review and modify and approve coordination drawings in cooperation with individual installers and subcontractors to assure conflicts are resolved before work in field is begun

and to ensure location of work exposed to view is as indicated or as approved by Engineer.

1. The Contractor shall stamp, sign and submit coordination drawing originals to Engineer for review.

2. Do not commence work in areas described in the coordination drawings until receipt of Engineers comments.

1.05 PROJECT ADMINISTRATION

A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

B. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

C. Conduct conferences among subcontractors and others concerned with the Work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Closeout activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00

REMOVAL OF EXISTING FACILITIES

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

A. The general provisions of the Contract Documents and General Requirements apply to the work in this section.

1.02 DESCRIPTION

A. The work covered under this section includes furnishing of all labor and equipment and coordinating the efforts of the contractors in connection with performing the required demolition/removal indicated on the Drawings, and in accordance with these Specifications.

B. This section is intended to clarify those items of removal/demolition which are the responsibility of the Contractor.

C. All equipment and material called for removal shall become the property of the Contractor. If the Owner selects to retain ownership of said items, the Contractor doing the removal shall place the equipment in a location such that it is available for the Owner to pick up and transport in its own vehicles. All equipment and materials that the Owner decides to discard shall be properly disposed of offsite by the Contractor at no cost to the Owner.

D. The Contractor shall provide all labor, materials, equipment and scheduling necessary in order to demolish/remove those items specified on the Contract Drawings for demolition/removal and shall be responsible for any degree of unforeseen difficulty in the removal of said items.

E. Every effort has been made to indicate to the Contractor those items to be removed or demolished. All removal and demolition work is included in the lump sum price bid for the respective contract. It is the Contractor's responsibility to visit the site of the construction to ascertain the extent and complexity of the work involved. There will be no additional payment, due to the Contractor's failure to anticipate problems or due to delays caused by the need to coordinate the removal work with the installation of new materials or equipment or the work of other contractors.

1.03 RECORDS OF DEMOLITION WORK

A. The Contractor shall be responsible for coordinating and recording demolition work.

B. The Contractor shall record all removal work on a set of design drawings for the existing site.

C. Immediately following completion of demolition work for each site, the Contractor shall submit a marked-up set of drawings to the Engineer showing all demolition work.

1.04 SUBMITTALS

A. In compliance with the requirements established with the Contract, the Contractor shall provide the following:

1. Permit for transport and disposal of debris.

2. Demolition procedures and operational sequence for review and acceptance by the Engineer.

3. Signed receipts from disposal sites for hazardous and/or nonhazardous wastes must be delivered to the Owner prior to any payment made to the Contractor for that work.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 GENERAL

A. No removal or demolition shall occur without the approval of the Engineer. All demolition/removal shall be coordinated by the Contractor.

3.02 DEMOLITION BY THE CONTRACTOR

A. The demolition work intended for the Contractor shall include overall coordination of the removal/demolition work and removal and storage of all associated materials.

B. The work under this category includes, but is not limited to the following items:

1. Boilers.
2. Piping, Valves, Etc.
3. Breeching
4. Boiler Room Equipment

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 DEFINITIONS

A. Regulations include laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

1.02 APPLICABLE CODES AND REGULATIONS

A. All work shall be performed in accordance with the latest version, by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement, except as indicated otherwise, of all applicable codes including the following:

B. All work shall be performed in accordance with the latest version, except as indicated otherwise, of all applicable codes including the following:

1. Commonwealth of Massachusetts State Building Code, Eighth edition.

2. Commonwealth of Massachusetts State Plumbing Code.

3. Commonwealth of Massachusetts State Electrical Code.

4. National Fire Protection Association: INFPA 101 - LIFE SAFETY CODE, Edition.

5. National Fire Protection Association: 90A and 90B

6. Commonwealth of Massachusetts Regulation 527 CMR (FPR-9) PREVENTION OF FIRE IN BUILDINGS.

7. Commonwealth of Massachusetts Regulation 521 CMR: ARCHITECTURAL ACCESS BOARD", as amended.

8. United States Occupational Safety and Health Administration (OSHA):Standard N2. 29-CFR-1926.59 - HAZARD COMMUNICATION STANDARD.

9. United States Department of Justice, NQ 28 CFR Part 36 - AMERICANS WITH DISABILITIES ACT, (Public Law 101 -336).

10. Commonwealth of Massachusetts Regulation CMR 38:00 - Regulations For Governing School Building Assistance Act, Chapter 645, 603.

11. IMC International Mechanical Code IMC-2009.

C. Publication Dates: Where the date of issue of a code or regulation is not specified, comply with the standard in effect as of date of Contract Documents, or as otherwise required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)
END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including performance of each step in sequence. Notify Engineer when manufacturers' instructions conflict with the provisions and requirements of the Contract Documents; obtain clarification before proceeding with the work affected by the conflict.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate high standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.02 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When called for by individual Specification Sections, provide at no additional cost to the Owner, manufacturers' or product suppliers' qualified staff personnel, to observe site conditions, start-up of equipment, adjusting and balancing of equipment, conditions of surfaces and installation, quality of workmanship, and as specified under the various Sections.

1. Individuals shall report all observations, site decisions, and instructions given to applicators or installers. Immediately notify Engineer of any circumstances which are supplemental or contrary to, manufacturer's written instructions.

2. Submit full report within 30 calendar days from observed site conditions to Engineer for review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 DEFINITIONS

A. "Products" is defined as new material, machinery, components, equipment, fixtures, and systems used in the Work. Products do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

B. "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

D. Definitions in this article are not intended to negate the meaning of other terms used in Contract Documents, including "specialties", "systems", "structure", "finishes", accessories", furnishings, "special construction", and similar terms, which are self explanatory and have recognized meanings in the construction industry.

1.02 BASIC PRODUCT REQUIREMENTS

A. To the fullest extent possible, provide products of the same kind, from a single source.

B. Provide interchangeable components of the same manufacturer, for similar components.

C. When the Contractor has the option of selecting two or more products, ensure that products selected shall be compatible with products previously installed or approved.

D. Provide all products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

1.03 PRODUCT OPTIONS

A. Product selections: Comply with the following for selection of products:

1. Products specified by reference standards or by description only: Provide any acceptable product meeting those standards or description.

2. Products specified by performance requirements only: Provide any acceptable product which has been tested to show compliance with specified requirements, including indicated performances.

3. Products specified by naming one or more manufacturers: Provide products of manufacturers named and meeting specifications, no options or substitutions are allowed.

4. Products specified by naming one or more manufacturers with a provision for substitutions: Provide products of manufacturers named, or submit a request for substitution for any manufacturer or product not named.

B. Visual matching: Where Specifications require matching a sample, the Engineer's decision on whether a proposed product matches is final. Where no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.

1.04 PRODUCT DELIVERY AND HANDLING REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions and as specified in individual specification sections.

B. Schedule deliveries to minimize long-term storage and prevent overcrowding of construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle and store products by methods to prevent soiling, disfigurement, or damage.

1.05 PRODUCT STORAGE AND PROTECTION REQUIREMENTS

A. Store and protect products in accordance with manufacturer's instructions and as specified in individual specification sections.

1. Provide all necessary equipment and personnel to store products by methods to prevent soiling, disfigurement and damage.

B. Store and protect products with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

C. For exterior storage of fabricated products, place on sloped supports, above ground.

D. Provide off-site storage and protection when site does not permit on-site storage or protection.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

F. Store heavy materials in locations and in a manner that will not damage or disfigure new construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 73 10

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 2 Section "Selective Demolition" for demolition of selected portions of the building.

2. Divisions 2 through 26 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

C. Cutting and Patching required for the removal of existing and installation of new piping through exterior walls as part of the work for the preparation of work for this project.

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original or as new condition after installation of other Work.

1.04 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

3. Products: List products to be used and firms or entities that will perform the Work.

4. Dates: Indicate when cutting and patching will be performed.

5. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

6. Architect/Engineer Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.05 QUALITY ASSURANCE

A. Structural Elements: Do not cut on patch any structural elements.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Communication systems.
3. Conveying systems.
4. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner or reduces the performance quality of the building envelope in other than an as new condition.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.06 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 –PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

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

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations. Provide for demolition in a way that prevents damage to existing components that are to remain.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.03 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Revise subparagraph below to suit Project.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Refer to Selective Demolition for Asbestos abatement at pipes. Do not proceed with work until abatement is complete.
6. Avoid damage and minimize repair required to demountable partitions.
7. Retain subparagraph below if required to prevent multiple cutting and patching in the same area. Add specific requirements for multiple contracts and special conditions requiring coordination.
8. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.
    c. Replace damage demountable partitions and paint to match existing color.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01731

SECTION 01 75 00

STARTUP AND ADJUSTING

PART 1 - GENERAL

1.01 TESTING, ADJUSTING, AND BALANCING

A. General: Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Reports will be submitted to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.02 DEMONSTRATING EQUIPMENT

A. Demonstrate operation and maintenance of Products to Owner's personnel 2 weeks prior to date of Completion.

B. Demonstrate project equipment, instruct with a qualified manufacturers' representative who is knowledgeable about the project.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

1.03 OPERATION, MAINTENANCE, AND SERVICE

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer and Owner 7 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible manufacturer's representative or Contractors' personnel (as appropriate) in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.04 INSTRUCTION AND TRAINING OF OWNER'S PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 CLOSEOUT PROCEDURES - COMPLETION

A. Prior to requesting inspection for certification of Completion, complete the following:

1. Submit list of incomplete items, value of incomplete work, and reasons work is not complete.

2. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:

   a. Certificate of Final Inspections.

   b. Certificate of Occupancy.

3. Submission of product and installation warranties, workmanship bonds, maintenance agreements, installer certifications and similar documents specified in individual sections.

4. Submission of test/adjust/balance reports.

5. Remove temporary facilities and services that are no longer required.

6. Complete Final Cleaning, including repair and restoration, or replacement of damaged Work.

7. Remove surplus materials, rubbish and similar elements.

8. Application for reduction of retainage.

9. Consent of Surety.

10. Advise the Owner of the change-over in security provisions.

11. Notification of shifting insurance coverages.

12. Final progress photographs.

B. Within 1 week after receipt of the notice of Completion from the Contractor, the Engineer will inspect to determine status of completion.

1. Should the Engineer determine that the Work is not complete:

   a. The Engineer will notify the Contractor in writing, stating the reasons therefore.

   b. The Contractor shall remedy the deficiencies and send a second written notice of Completion to the Engineer, requesting re-inspection.

C. When the Engineer concurs that the Work is complete:

1. The Engineer will issue a construction completion affidavit accompanied by the Contractor's list of items to be completed or corrected, as verified by the Engineer

2. The Engineer will submit the Certificate to the Owner, and to the Contractor, for their written acceptance of the responsibilities assigned to them in the Certificate.

1.02 CLOSEOUT PROCEDURES - FINAL ACCEPTANCE

A. Prior to requesting inspection for certification of Final Acceptance and final payment, perform the following:

1. Completion of incomplete Work. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.

2. Prove that all taxes, fees and similar legal obligations have been paid.

3. Submit final payment requests with release of all liens, and supporting documentation.

4. Provide written assurances that all unsettled claims are in the process of and will be resolved.

5. Submit updated final statement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deductions, previous Change Orders, total adjusted Contract Sum, previous payments and Contract Sum due.

6. Submit consent of surety to Final Payment.

7. Submit evidence of continuing insurance coverage complying with insurance requirements.

8. Remove remaining temporary facilities and services.

9. Deliver to Owner and obtain receipts for:

a. Titles for Owner's Representative's computer, printer and associated peripherals, including both hardware and software.

b. Operation and Maintenance Manuals for items so listed in individual Sections of the Specifications, and for other items when so directed by the Engineer.

c. Project Record Documents (as-builts), including reproducible mylars and Autocad format drawings on disc.

d. Warranties and bonds specified in individual Sections of the Specifications.

e. Spare parts and materials extra stock.

f. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be

reached for emergency service at all times including nights weekends, and holidays.

12. Submit Certification stating Work has been inspected for compliance with the Contract Documents.

13. Submit Certification stating equipment and systems have been tested in presence of Owner's representative and are fully operational.

14. Submit Certification stating that Work is 100 percent complete and ready for final inspection.

B. Within 2 weeks after receipt of the request for Final Acceptance from the Contractor, the Engineer will inspect to determine status of completion.

1. Should the Engineer determine that the Work is incomplete or defective:

a. The Engineer will notify the Contractor in writing, stating the reasons listing the incomplete or defective work.

b. The Contractor shall take immediate steps to remedy the deficiencies and send a second written notice of request for Final Acceptance to the Engineer.

c. Costs relative to the Engineers re-inspection due to failure of Work to comply with claims made by the Contractor, will be compensated by the Owner, who will deduct the amount of such compensation from the Final Payment due to the Contractor.

C. After the Engineer finds the Work acceptable, the Engineer will review the Final Closeout submittals.

D. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements of the General Conditions and Supplementary Conditions.

1. The Engineer will prepare a Final Change Order, reflecting approved adjustments to the Contract Sum not previously made by other Change Orders.

1.03 CONFERENCES AFTER COMPLETION

A. The Owner reserves the right to call for conferences commencing with the date of Completion and continuing for one year thereafter, for purposes of inspecting the Work and to plan correction of any deficiencies or failures discovered during this period.

1. Attendance is required by Contractor's Project Manager, Engineer, Owners Project Representative and each applicator, installer, and supplier as the Owner may direct or the Contractor may wish to have present. All representatives attending such meetings shall be the same persons, or shall have the same powers and authority, as those attending progress meetings occurring prior to the Date of Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.00 GENERAL PROVISIONS

A. The conditions of the contract and other sections of Division I – General Requirements apply to the work of this section

B. Examine all drawings and all other sections of the specifications for requirements therein affecting the work of this trade.

1.01 WORK INCLUDED

A. Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Selective demolition work as indicated on the drawings.

2. Types of Selective Demolition Work include, but is not limited to, the selective removal and subsequent off site disposal of the following:

1. Equipment, piping, ductwork, etc. within the existing areas indicated as to be removed.

3. Salvage of existing items to be reused or recycled.

B. Related work specified elsewhere:

1. Relocation of pipes, conduits, ducts, other mechanical and electrical work are specified by respective trades.

2. Disconnection of existing electrical per 260000, water per 230000 as necessary for demolition as specified by respective trades.

1.02 RELATED SECTIONS

A. Carefully examine all the contract documents for requirements, which affect the work of this section.

B. Other work, which directly related to the work of this section, including but not limited to:

1. Section 01731 – Cutting and Patching

2. Section 220000 – Plumbing

3. Section 230000 – Heating, Ventilating and Air Conditioning

4. Section 260000 – Electrical

1.03 DEFINITIONS

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

2. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

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

4. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 SUBMITTALS

A. Refer to Section 013000—Submittals for general requirements related to submittals.

B. Submit schedule of operations for selective demolition work. Include coordination for shut off, capping, and continuation of utility services, together with details for dust and noise control protection.

1. Coordinate with the Owner's continuing occupation of portions of the Building.

2. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.

3. Interruption of utility services. Indicate how long utility services will be interrupted.

4. Coordination for shutoff, capping, and continuation of utility services.

5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

6. Means of protection for items to remain and items in path of waste removal from building.

C. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

1. Comply with submittal requirements in Division 1 Section "Construction Waste Management."

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.05 JOB CONDITIONS

A. The Owner will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will impact Owner's normal operations.

B. The Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at the time of commencement of the contract will be maintained by the Owner insofar as practicable. However, variations within the structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

C. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from the site as they are removed. The storage or sale of removed items on the site will not be permitted.

D. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.

1. Provide protective measures to provide free and safe passage of Owner's personnel and general public to and from occupied portions of the facility.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure of elements and demising walls adjacent to ceilings be demolished, and adjacent facilities or work to remain.

3. Protect from damages existing finish work that is to remain in place which will become exposed during demolition operations.

4. Protect floors with coverings.

5. Remove protection at completion of work.

E. Promptly repair damages caused to adjacent facilities by demolition work at no additional cost to the Owner.

F. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

1. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide

alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Use of explosives will not be permitted or required.

H. Maintain existing utilities, keep in service, and protect against damage during demolition operations.

1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

I. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

1.06 WARRANTY

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.00 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing structure surfaces, equipment or surrounding properties which could be misconstrued as being damaged from selective demolition work. File with Owner's Representative prior to starting work.

3.01 PREPARATION

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1. Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

B. Cover and protect equipment and fixtures from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

C. Erect and maintain dust proof partitions and closures to prevent spread of dust or fumes to occupied portions of the building.

D. Locate, identify, stub off and disconnect utility services that are not indicated to remain.

1. Provide bypass connections as necessary to maintain continuity of service to occupied areas of the facility. Provide minimum of 48 hours advance notice to Owner if shut down of service is necessary during changeover.

3.02 SELECTIVE DEMOLITION

A. Perform selective demolition work in a systematic manner. Use such methods to complete work indicated on Plans in accordance with demolition schedule and governing regulations.

1. Demolish mechanical system in sections small enough to preclude any damage to adjacent areas that are to remain intact.

2. Promptly remove all debris.

3. Provide services for effective air and water pollution controls as may be required by local authorities having jurisdiction.

B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit a written report with accurate details to the Owner's Representative. Pending receipt of directive from the Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

D. The existing facility will continue to operate during all phases of the demolition work and the subsequent construction. No interruption of the heating and domestic hot water systems will be permitted without prior approval of the Owner.

E. Submit proposed methods and sequence of operations for the selective demolition work to the Owner's Representative for review prior to the start of the work.

F. Perform all demolition while ensuring minimum interference with adjacent occupied areas.

G. Where sections of a system (piping, ductwork, etc.) are to be removed and the system serves other areas of the building that are outside the scope of the work:

1. Coordinate the temporary shut down of the system with the Owner's representative.

2. Install supports in the remaining active sections of piping (or ductwork) required by the removal of nearby supports associated with the demolition.

3. Isolate the piping system to be removed by closing an appropriate isolation valve (install one, if required), drain the section to be removed, and then cleanly cut and remove the section.

4. Cap watertight (or airtight) the remaining piping (or ductwork) section, and reactivate the remainder of the system.

H. Provide temporary shoring or bracing during the demolition work to prevent movement, settlement, or collapse of the system or adjacent systems due to the work.

I. Promptly repair any damage caused to adjacent facilities or areas that are to remain at no additional cost to the Owner.

J. Equipment

1. Coordinate with the Electrical Subcontractor to provide electrical disconnection prior to equipment removal.

2. Remove equipment by unfastening at the supports or attachments. Then remove the attachments from the building, leaving no component of the original installation.

3. Certain equipment (rooftop units, etc.) may be required to be cut into sections and removed in pieces.

K. Exercise care with equipment that is to be turned over to the Owner. Examine the equipment before removal in the presence of the Owner's representative to determine its condition. Make a record of any mars, etc. by a photograph or videotape acknowledged by the Owner's representative.

L. Equipment to be turned over to the Owner: deliver to a location designated by the Owner, and obtain acknowledgment of receipt in good condition.

M. All equipment, etc., not turned over to the Owner shall become the property of the Contractor, and shall be removed from the site.

N. If water is used during saw cutting it shall be contained and not allowed to run into the existing floor drains. Care shall be taken that water does not damage any existing areas, utilities, and or electrical lines.

O. All cut masonry and concrete surfaces shall be smooth. Do not leave any jagged edges of concrete or reinforced steel. If overcutting occurs, the Contractor shall submit a repair procedure for approval and shall execute the same at no cost to the Owner.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

C. Refer to Waste Management section in the specifications.

3.04 CLEANUP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protection and leave interior areas broom clean.

B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION

TABLE OF CONTENTS

SECTION 220000

PLUMBING

PART 1 - GENERAL

1.00 GENERAL PROVISIONS

A. The GENERAL REQUIREMENTS, DIVISION 1, and BIDDING AND CONTRACT REQUIREMENTS, DIVISION 0, are hereby made a part of this Specification Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 SCOPE OF WORK

A. This project included the replacement of fourteen (14) gas fired steam boiler with three (3) new boilers. Three (3) boilers will be dedicated to space heating.

B. Refer to the specific requirements for this project included in the “Narrative Report for Compliance with the Energy Conservation Section of the Massachusetts State Building Code (780CMR) – Approval and Acceptance”, which shall be considered part of these specifications. Include all associated testing and certifications necessary for compliance and any required remedial actions and retesting due to failure.

C. The building is to be commissioned. Provide all labor required to fully test and demonstrate that all systems operate as designed.

D. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems. In general, the following items are specified under this section:

E. Water Systems:

1. Domestic (Potable) water piping system.
2. Cross Connection Control-all Backflow Preventers
3. Non-Potable Water System for HVAC.

F. Compressed Gas Systems:

1. Natural gas Systems.
2. Gas Piping from Utility meter to building Users.
3. Gas Booster.
4. Extend all gas train vents to atmosphere.
5. Final connection to all gas fired equipment includes valves, regulators, drip and dirt pockets, unions and necessary appurtenances.
6. Controls: low voltage and line voltage control wiring for specified systems

G. General:

1. Testing and Cleaning of all piping systems
2. Valves.
3. Fittings unions, flanges and couplings.
4. Service water connections for equipment provided under HVAC section.

5. Hangers, plates and inserts.
6. Cleaning, testing and disinfection of piping systems.
7. All supplementary steel for piping and equipment support.
8. Drilling for installation of inserts.
9. Vibration isolation and flexible connections.
10. Fire seal off all penetrations in floors and walls to the rating of the barrier.
11. Core drilling.
12. Operating and Maintenance Manuals
13. Coordination Drawings
14. Shop Drawings
15. Record (As-Built) Drawings

H. Work of this Section is generally shown on the Plumbing Drawings.

1.02 RELATED WORK

A. Principal classes of Work related to the Work of this Section are listed in the Specification Table of Contents, and are specified to be performed under the indicated Sections of the Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. Coordinate and schedule the Work of this Section with that of all other trades.

B. The following work is not included in this Section and will be provided under other Sections:

1. Concrete work including concrete housekeeping pads.

2. Painting, except as specified herein.

3. Electrical power wiring for all equipment.

4. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing. Refer to Division 1, General Conditions.

5. Flashing of roof penetrations.

1.03 DEFINITIONS

A. As used in this Section, the following items are understood to have the following meaning:

1. "***Contractor or Subcontractor"***, unless otherwise qualified, shall mean the installer of the work specified under this Section.

2. "***Furnish"*** shall mean purchase and deliver to the project site, complete with every necessary appurtenance.

3. ***"Install"*** shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.

4. ***"Provide"*** shall mean "Furnish" and "Install".

5. ***"Work"*** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.

6. ***"Concealed"*** shall mean hidden from sight in chases, furred-in spaces, shafts, hung ceilings, embedded in construction or in a crawl space. Areas to be concealed as part of tenant alterations to the building shall also be considered in this definition.

7. ***"Exposed"*** shall mean not installed underground or concealed as defined above.

8. ***"Furnished by others"*** shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.

9. ***"Owners Representative"*** shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.

10. ***"Date of Substantial Completion"*** shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy purposes. The GENERAL REQUIREMENTS, DIVISION 1, shall supercede this definition where specifically defined.

11. ***"Piping"*** shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.

1.04 CODES, REFERENCES AND PERMITS

A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with Massachusetts Department of Public Safety Codes, Massachusetts Department of Environmental Protection, Massachusetts State Building Code 780 CMR and any other Codes and Regulations having jurisdiction including but not limited to:

1. Massachusetts State Plumbing Code (248 CMR 10.00)

2. Massachusetts Fuel Gas Code (248 CMR 3.00, 4.00, 5.00 and 7.00)

3. State and Local Building Codes

4. All applicable NFPA Standards

5. Occupational Safety and Health Administration (OSHA)

6. Underwriters' Laboratories, Inc (UL)

B. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:

1. American National Standards Institute (ANSI)

2. American Society of Mechanical Engineers (ASME).

3. American Society of Testing and Materials (ASTM)

4. American Water Works Association (AWWA)

5. Institute of Electrical and Electronic Engineers (IEEE)

6. National Association of Plumbing-Heating Cooling Contractors (NAPHCC)

7. National Electrical Manufacturer's Association (NEMA)

8. National Fire Protection Association (NFPA)

9. National Sanitation Foundation (NSF)

C. All pressure vessels shall conform to ASME and Massachusetts Codes and Regulations.

D. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.

E. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner's Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner's Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.05 GENERAL REQUIREMENTS

A. Nameplates

1. Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the equipment.

B. Equipment Guards

1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

1.06 MATERIAL AND EQUIPMENT STANDARDS

A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner's Representative.

B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process. Highlight and list all applicable specification requirements, which the substituted material deviates from.

C. If a substitution of materials or equipment in whole or in part is made, bear the cost of any changes necessitated by any other trade as a result of said substitution.

D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

E. All material, equipment and accessories provided under this section must be listed on the Massachusetts Board of Registration of Plumbers and Gas Fitter's approved Plumbing Products System.

1.07 SUBMITTALS

A. Conform to the requirements of Division 1, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this Section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractors and shall note the name(s), license number(s) and license expiration dates(s) of the Contractor(s) installing the Plumbing work.

B. Definitions:

1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.

2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications, certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:

a. Meet all performance criteria listed in the schedules and outlined in the specifications.

b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will fit within the available space – this determination is solely the responsibility of the Contractor.

c. Products must adhere to all architectural considerations including, but not limited to; being of the same color as the product scheduled or specified and fitting within the architectural enclosures and details.

C. Submittal Procedures, Format and Requirements

1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.

2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:

a. Title

b. Equipment number

c. Name and location of project

d. Names of Owner, Engineer and Seller

e. Names of manufacturers, suppliers, vendors, etc.

f. Date of submittal

g. Whether original submittal or resubmitted

3. Shop Drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum ¼" = 1' scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary.

4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.

5. Provide Shop Drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.

6. Provide complete data for all auxiliary services and utilities required by submitted equipment.

7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces with a central control system.

8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.

9. The Owner's Representative shall approve all materials before commitment for materials is made.

D. Product Data: Submit complete manufacturer's product description and technical information including:

1. Piping – General. A submittal is required for each pipe class listed in these specifications.

2. Gas Booster

3. Unions and Flanges

4. Pipe Joint Materials

5. Hangers, Inserts and Supports

6. Seismic Restraints

7. Sleeves, Firestopping

8. Valves

9. Watertight Sleeves

10. Identification, labels and tags, including database for all equipment & devices.

11. O&M table of contents

12. Submit All Related Valves, Fittings, Unions, Flanges And Couplings

13. For welded systems, submit weld coupons

14. Seismic Restraints

15. Fire rated penetration assemblies indicating ASTM E814 (UL 1479) classification for the application involved. Submittals of individual components or products (i.e., mortars or sealants) without detailed installation drawings shall be rejected as incomplete submittals.I

16. Sleeve packing

17. Vibration isolation and flexible connections.

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

1. Do not submit multiple product information in a single bound manual.

2. Three-ring binders shall not be accepted.

F. Deviations

1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.

2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.

3. Approval of proposed deviations, if any, will be made at discretion of Engineer.

G. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required when more than five shop drawings of a single trade are received in one calendar week.

H. Responsibility

1. Intent of Submittal review is to check for capacity, rating, and certain construction features. Ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the Plumbing Contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. Inform Contractors, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.

I. In the event that the Shop Drawings for any of the products specified herein are not provided:

1. Furnish and install all materials and equipment herein specified in complete accordance with these Specifications.

2. If materials and/or equipment are installed that are not in complete accordance with these specifications, remove this material and/or equipment. Replace material and/or equipment with material and/or equipment that are in complete accordance with these specifications, at the direction of the Owner’s Representative.

3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.

4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.

J. Mark dimensions and values in units to match those specified.

K. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.08 OPERATION AND MAINTENANCE DATA

A. Commence preparation of the Operating and Maintenance (O&M) Manuals immediately upon receipt of “Approved” or “Approved as Noted” shop drawings and submit each section within one month. The final submission shall be no later than two months prior to the projected date of Substantial Completion of the Project.

B. Submit the O&M Table of Contents in the submittal phase. O&M manuals shall be built as submittals are accepted and shall include the individual equipment manufacturer’s data retrieval sheet, as per Attachment A in Part IV for input into the Owner’s Maintenance Management System. Form shall be provided and competed electronically.

C. Each O&M document shall include the manufacturer’s web address for equipment specific O&M information for Internet access by the Owner.

D. The manual shall consist of (3) sets of manuals and include (3) sets of CDs, which shall contain the scanned content of the entire manual. The manual shall highlight the actual equipment used and not be a master catalog of all similar products of the manufacturer. The manual shall be submitted for review prior to creation of the CDs.

E. The Manual shall contain the following:

1. Operations Manual

a. Systems description including all relevant information needed for day-to-day operations and management including start-up and shut-down instructions.

b. Systems description including all relevant information needed for day-to-day operations and management.

c. Wiring diagrams, schematics, logic diagrams and sequence of operations that accurately depict the controls system.

2. Maintenance Manual

a. Maintenance and Lubricating Chart: furnish three sets of charts indicating equipment tag number, location of equipment, equipment service, greasing and lubricating requirements, lubricants and intervals of lubrication. One chart shall be framed under glass and mounted where directed by the Owner's Representative.

b. Valve and System Chart: correspond to valve tags, refer to paragraph identification systems.

c. Recommend List of Spare Parts: furnish two typed sets of instructions for ordering spare parts with sectional views of the fittings or equipment showing parts numbered or labeled to facilitate ordering replacements. Each set shall include a list with itemized prices of those parts recommended to be kept on hand as spares, as well as the name and address of where they may be obtained.

d. Provide all information as listed on the Facility Support Services data sheet as per Attachment A in Part IV for input into the Owner's Maintenance Management System. Form shall be provided and completed electronically.

e. Provide copy of all warranty information with associated date of substantial completion (Commencement of Warranty) and end date of coverage all components / subsystems specifically included and excluded.

3. Provide O&M manuals for each of the following:

a. CO Detection System

1.09 RECORD DRAWINGS

A. Refer to DIVISION 1, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.

B. Record Drawings (red-line drawings) will be updated daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as

completed, including dimensions (vertical/horizontal of concealed components off fixed building elements.

C. Maintain complete and separate set of prints of Contract Drawings at job site at all times and record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.

D. At completion of work prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. Transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CAD layering as established by the A&E design team shall be maintained with any and all changes done by the Contractor.

E. The Architect and Engineer are not granting to the Contractor any ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Architect and Engineer are granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Architect and Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Architect and Engineer harmless from all loses, claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.

F. Record Drawings, shall show "as-built" condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and model numbers of final equipment installation.

G. Submit the record set for approval by the engineer a minimum of four weeks prior to seeking the permanent certificate of occupancy.

1.10 WARRANTIES

A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all liabilities which the manufacturer and the Contractor may have by law or by provisions of the Contract Documents.

B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one-year (1) commencing with the Date of Substantial Completion. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.

C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.

D. Upon receipt of notice from the Owner of the failure of any part of the systems during the warranty period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.11 COORDINATION

A. Refer to **DIVISION 1, GENERAL CONDITIONS**, for record drawings and procedures to be provided under this Section, unless specifically noted otherwise in this Section.

B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.

C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner's Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner's Representative's satisfaction at no expense to the Owner.

D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, pipes, sleeves, etc., and give information in advance to allow construction of required openings. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the General Contractor for the proper setting of same.

F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.

G. Make reasonable modifications in the work as required by structural interferences, interference with work of other trades, or for proper execution of the work without extra charge.

1.12 COORDINATION DRAWINGS

A. Provide a set of Plumbing coordination drawings for use in verifying required code clearances (as well as clearances for operation, repair, removal and testing) of all Plumbing equipment and for use in coordinating installation of equipment with other trades. Where practical, the CADD layering as established by the A&E team for the construction documents shall be utilized in the preparation of all coordination drawings. Where CADD layering deviates from the A&E team's layering convention, submit the proposed layering system for approval. The CADD layering used shall provide, as a minimum, the flexibility of illustrating trade specific items similar to the established A&E team layering standard.

B. The intent of the coordination drawings is to identify and resolve installation conflicts prior to fabrication and installation of any MEP trade.

C. The HVAC Contractor's coordination drawings shall be the basis for floor plan coordination. The Electrical Contractor's reflected ceiling plans shall be the basis for ceiling coordination.

D. The CADD Drawings prepared by the Architect and Engineer contain representations of certain elements of the Project, and are not necessarily complete, nor are the CADD Drawings comparable or identical to final construction drawings. The Architect and Engineer make no representations or warranties with respect to the accuracy or completeness of the CADD Drawings. The Architect and Engineer do not recommend that the Contractor use the CADD Drawings in connection with the preparation of shop drawings. Should the Contractor choose to do so, however, the Contractor shall carefully review and compare the CADD Drawings with the corresponding final construction drawings to verify their accuracy and identify all discrepancies, differences, and inconsistencies in design, locations, dimensions, scope, and all other respects between the CADD Drawings and the corresponding final construction drawings. The Contractor, shall base the preparation and submission of shop drawings, and in general, shall base the performance of all its obligations with respect to the Project upon the information contained in the final construction drawings and not the CADD drawings. Nothing shall be construed as to relieve the Contractor of any of its obligations (such as, by way of illustration, the obligation to make field measurements or to coordinate drawings) under its contract with respect to the Project.

E. Plumbing Coordination Drawings

1. Prepare Coordination Drawings showing all Plumbing work to be installed as part of Section 220000. The Coordination Drawings shall be created using AutoCAD and shall have a scale not less than ⅜ inch for Mechanical / Electrical Rooms and ¼ inch for all the areas.

2. The Plumbing Coordination Drawings shall show all piping, drains, equipment, sleeves, inserts, fixtures and supports.

3. After incorporating all trades, resolve any areas of conflicts between trades under the direction of the General Contractor / Construction Manager and submit fully coordinated drawings to the Owner’s Representative.

4. Do not install any of this work prior to the preparation and Engineer’s review of the final Coordination Drawings. If Plumbing work proceeds prior to the final Coordination Drawings, any changes to the Plumbing work to correct the interferences and conflicts which result will be made by this Contractor at no additional cost to the Owner.

5. Coordination Drawings are for this Contractor's and Owner’s Representative's use during construction and shall not be construed as replacing any shop, "as-built", or Record Drawings required elsewhere in these Contract Documents.

6. Owner’s Representative's review of Coordination Drawings shall not relieve this Contractor from his overall responsibility for coordination of all work performed pursuant to the Contract or from any other requirements of the Contract.

1.13 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice-versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense to the Owner.

B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be

determined at the project and shall have the approval of the Owner's Representative before being installed. Follow Drawings, including his shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Owner's Representative before proceeding with the installation. Without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of proposed solution.

D. Size of pipes and methods of running them are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the true intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge. All work shall be installed in an approved workmanlike manner.

1.14 INSPECTION OF SITE CONDITIONS

A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed. Report, in writing, to the Owner's Representative, any conditions which might adversely affect his work.

1.15 SURVEY AND MEASUREMENTS

A. Base all required measurements, horizontal and vertical, from referenced points established WITH the Owner's Representative and be responsible for correctly laying out the Work required under this Section of the Specification.

B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.16 DELIVERY, STORAGE AND HANDLING

A. No materials shall be delivered or stored on site until corresponding Shop Drawings have been approved.

B. All manufactured materials shall be delivered to the site in original packages or containers bearing the manufacturers labels and product identification.

C. Protect materials against dampness. Store off floors, under cover and adequately protected from damage.

D. Inspect all plumbing equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.17 PROTECTION OF WORK AND PROPERTY

A. Be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.

B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.

C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.

D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.18 SUPERVISION

A. Supply the service of a competent Supervisor with a minimum of 5 years experience in Plumbing Construction Supervision who shall be in charge of the Plumbing work at the site.

1.19 SAFETY PRECAUTIONS

A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.

B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and/or property.

1.20 SCHEDULE

A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.21 HOISTING, SCAFFOLDING AND PLANKING

A. The work to be done under this Section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, helicopters, scaffolds, staging and planking as required for the work.

1.22 CUTTING AND PATCHING

A. Provide all cutting and patching necessary for the proper installation of work to be performed under this Section.

B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.

C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and shape and consult with the Owner's Representative and all other trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.

D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.

E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment which is part of this Section of the Specifications.

F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.

G. Assume any cost caused by defective or ill-timed work required by this Section of the specifications.

H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.23 SLEEVES, INSERTS AND ANCHOR BOLTS

A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this section of the specifications.

B. All pipes passing through floors, walls, ceilings or partitions shall be provided with fire stopping to maintain the fire rating of the structure. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details. Provide sleeves for all penetrations where required by the listed detail, for the penetration of all mechanical room floors and where specifically required on the drawings.

C. Field drilling (core drilling), when required, shall be performed under this section of the specifications, after receipt of approval by the Owner's Representative.

1. When coring cannot be avoided, provide ¼ inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below and protect and piping, ductwork, wiring, furniture, personnel, etc., below the location of the core.

1.24 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

A. Provide all supplementary steel, factory fabricated channels and supports required for the proper installation, mounting and support of all Plumbing equipment, piping, etc., required by the Specifications.

B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative as shown on the drawings or herein specified.

C. The type and size of the supporting channels and supplementary steel shall be determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.

D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

E. All supplementary steel including factory fabricated channels, supports and fittings shall be approved, shall be galvanized steel, aluminum or stainless steel where exposed or subject to rust producing atmosphere and shall be manufactured by Unistrut, H-strut, Powerstrut or approved equal.

1.25 HAZARDOUS MATERIALS

A. Dispose of all hazardous materials in accordance with Federal and State laws. All handling shall conform to EPA requirements. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment. Provide breakout cost for this scope.

B. Removed equipment or fluids containing any hazardous materials such as ethylene glycol, or oil shall be recycled by a licensed facility approved by the Owner's Representative.

C. Where it has been identified that asbestos-containing material exists within the scope limits, refer to the Asbestos Abatement specification section for requirements. Where insulation is removed, provide new insulation (type and thickness as specified in this section). Where scope is not defined, provide unit prices with bid for all pipe and sizes involved.

1.26 ACCESSIBILITY

A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.27 SEISMIC RESTRAINT REQUIREMENTS

A. Submit working plans and calculations reviewed, signed and stamped by a professional engineer who is registered in the State where the project is located and has specific experience in seismic calculations, certifying that the plans meet all seismic requirements established by authorities having jurisdiction over the project.

1.28 WELDING QUALIFICATIONS

A. [Piping shall be welded in accordance with qualified procedures using performance qualified welders and welding operators.] Procedures and welders shall be qualified in accordance with ASME BPV IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer, may be accepted as permitted by ASME B31.1. The Owner's Representative shall be notified 24 hours in advance of tests, and the tests shall be performed at the work site if practicable. Welders or welding operators shall apply their assigned symbols near each weld they make as a permanent record. Structural members shall be welded in accordance with Section 05055 WELDING STRUCTURAL.

B. A fire watchman with an approved fire extinguisher shall be posted at the site of the welding work, during that work, and for a minimum of 30 minutes after the work is completed, to see that sparks or drops of hot metal do not start fires.

1.29 ELECTRICAL WORK

A. All electrical apparatus and controls furnished, and the installation thereof, as a part of the Plumbing work, equipment, and controls shall conform to applicable requirements under DIVISION 26 - ELECTRICAL.

1.30 PROJECT CLOSEOUT

A. Certificates Of Approval

1. Upon completion of all work, provide certificates of inspections from the following equipment manufacturers stating that the authorized factory representatives have inspected and tested the operation of their respective equipment and found the equipment to be in satisfactory operating condition and installed per the manufacturers installation instructions and requirements.

    a. Natural Gas Pressure Booster System

B. Construction Observations By The Engineer

1. The engineer is contracted to make progress site visits during construction, **one** substantial completion (punch list) site visit for determining substantial completion and **one** Final site visit to determine if all work is complete.

2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.

3. Progress Site Visits

    a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.

    b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.

C. Substantial Completion

1. When the Work under this Section is substantially complete, submit written notice with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Architect and/or Owner and he will not make a substantial completion site visit.

2. The following items shall be completed prior to the written request for substantial completion site visit:

    a. Certification of successful operation of all systems.

    b. Training of the Owner’s personnel in the operation of the systems.

    c. Record Drawings in accordance with the contract specifications.

    d. Operation and Maintenance manuals.

    e. Testing reports.

    f. Manufacturers certificates of approvals.

    g. Emergency contact list for reporting of malfunctioning equipment during the warrantee period.

    h. Contractors Project Completion certificate in accordance with the building code requirements.

3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.

4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list of the major deficiencies and a reason for the work not being considered substantially complete.

5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.

6. Remedy all deficiencies listed in the punch list within the time frame required by the contract.

D. Engineers Construction Completion Certification

1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers (RDK) when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete. The following is a minimum listing of the required systems to be tested with reports generated indicating they are complete and ready for use:

   a. Gas Distribution Pressure Test

   b. Equipment Start-Up/Test Reports

2. There shall be NO outstanding items identified on the punch list for scope within any of these categories.

E. Final Completion

1. The following items shall be submitted prior to the written request for Final completion:

   a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.

   b. Warranties commencing the date of Substantial completion

   c. Individual Signed and dated Punch List acknowledging completion of all punch list items

2. When all of the punch list work items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Architect or Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.

3. If the work is not fully complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any reobservations by the engineer.

F. Re-observation Fees

1. The re-observation fee shall be $1200.00 per visit.

G. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK can furnish a blank Contractor's certificate form upon request. The certificate shall certify:

   a. Execution of all work has been installed in accordance with the approved construction documents.

   b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.

2. The certificate shall include the following information:

   a. Project.

   b. Permit Number.

   c. Location.

   d. Construction Documents.

   e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.

   f. Addendum(a) and Revision Dates.

3. The certificate shall be signed by the Contractor and include the following:

   a. Signature.

   b. Date.

   c. Company.

   d. License Number.

   e. License Expiration Date.

PART 2 - PRODUCTS

2.00 RESERVED

2.01 PIPE, FITTINGS AND JOINTS - GENERAL

A. PIPE MATERIALS SPEC INDEX

SERVICE	CODE	MAXIMUM SERVICE OPERATING LIMITS		PIPE CLASS	PIPE MATERIAL
		(psig)	TEMPERATURE (°F)		
Gas Vent	IGV	100	250	A10	Copper
Non-Potable Water	NPW	100	250	A10	Copper
Gas (Natural)	G	50	70	A11	C. Steel
Gas Vent	GV	50	70	A11	C. Steel
Sleeve for Interior Under-ground Natural Gas Piping	G-S	50	120	A17	G. Steel

General Pipe Spec Notes:

1. Each Valve Type Shall Be The Product Of A Single Manufacturer. Each System Shall Be Provided With Valves As Required By Code And Shown On The Dwgs. And Shall Be Installed To Facilitate Operation, Replacement And Repair.
2. Provide Access Panels For Concealed Valves Behind Non-Removable Ceilings Or Walls.
3. Provide Shut-Off Valves On Supply Piping To Individual Pieces Of Equipment.
4. Provide Jointing Compounds As Required By Best Standard Practice And Only On Service As Recommended By Manufacturer.
5. All piping insulation and materials installed in return air plenums shall be plenum rated. Thermoplastic piping systems are hereby prohibited in return air plenums.
6. Piping Routed through Metal Stud or Wood Stud Partitions: provide centering such that piping does not come in contact with metal studs and also protection of piping systems routed horizontally through metal stud or wood stud partitions where the piping crosses a stud. Sleeve type protection shall be used to prevent damage to the lateral piping by the use of screws/nails/fasteners. Provide pre-manufactured products equal to Puncture Solution, or on site sleeves.

PIPE CLASS A10	½" to 3"	4" AND LARGER
PIPE	Seamless copper water tube, drawn temper, Type L. ASTM B-88. See Note 1.	Seamless copper water tube, drawn temper, Type L. ASTM B-88. See Notes 2 & 5.
FITTINGS	Wrought copper, solder-joint. ASME B16.22	Ductile iron coupling with copper alkyd enamel paint coating, ASTM A-536. Grade "E" EPDM elastomer gasket, ASTM D-2000. Equal to Victaulic Style 606 coupling. ASTM B-75 copper alloy fittings. ASTM B-584 grooved end cast bronze fittings for 6" pipe size.
JOINTS	ASTM B-32 solder filler material, Alloy Sb5 "95/5." ASTM B-813 liquid or paste flux. Soldering procedures shall comply with ASTM B-828.	Rolled groove prepared and assembled in accordance with manufacturer instructions.
MECHANICAL JOINTS	Cast copper alloy unions, hexagonal stock with ball-and-socket joint, solder joint ends. ASME B16.18.	ANSI Class 150 flange adapter equal to Victaulic Style 641 for connections to flanged equipment. ANSI B16.1 dimensions.
VALVES	Valves in the interior domestic water piping systems (cold water, hot water, and hot water return) shall be as manufactured by Apollo, Milwaukee, Nibco or Conbraco	
GATE	Use ball valve.	Use Butterfly valve.
BALL	All bronze, 3 piece, full port, PTFE seats, solder end connections. 600 PSIg WOG. Apollo 82-200, Milwaukee BA-350, Watts B-6801.	Class 125, cast iron body, FDA epoxy coated. Full port, flanged ends, stainless steel ball and stem. ANSI B16.1 flange dimensions. Watts G-4000-FDA series, Apollo IBV.
CHECK	Bronze body and clapper, solder ends, 200 WOG. Apollo 6IY Series, Milwaukee 1509, Stockham B-309.	Iron body, bronze mounted, flanged ends, 200 WOG. Apollo 910F Series, Milwaukee F-2974-M, Stockham G-931.
BALANCING	2" and Smaller. 300 psi threaded, soldered or Permalynx push-to-connect ends, non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4-turn digital readout hand wheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 787, 78K STAD, 786 STAS or approved equal by Bell & Gossett or Armstrong.	2 ½" or Larger. 250 psi Flanged or 350 psi Grooved ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM o-ring seals. 8, 12 or 16 turn digital readout hand wheel for balancing, hidden memory feature with locking tamper-proof setting. Victaulic / TA Hydronics Series 789 STAG, 788 STAF or approved equal by Bell & Gossett or Armstrong.
BUTTERFLY	Equal to Victaulic Series 608 butterfly valves bubble-tight shut-off to 300 psi with the following features: • join to the piping system with Style 606 couplings • double-seal disc design with a resilient elastomeric coating bonded to the ductile iron disc core. • the disc actuated by a manual lever, gear • Dead end service provided to full working pressure in both directions. • Sealing and positive shut-off are accomplished by a double ring seal	
DRAIN	All bronze, 2 piece, RPTFE seats, thread x solder end connections. 600 Psig WOG. Apollo	

PIPE CLASS A10	½" to 3"	4" AND LARGER
	78-100, Milwaukee BA-150, Watts BY-6001-CC. Hose thread adapter with cap and chain. Provide hose end vacuum breaker.	
Strainers	Bronze body, threaded or solder ends to suit, stainless steel screen, 400 pound wog.	
PRESSURE REDUCING VALVE	Control Valve, Pilot Operated. Watts M115, CLA-VAL, Apollo A127	

Notes:

1. Contact between dissimilar metals shall be made with di-electric couplings or di-electric flanges. Contact between ferrous and stud bolts and bronze flanges shall be electrically insulated with non-metallic washers.
2. Valves used for throttling of flow shall be butterfly type with memory stop. Ball valves shall not be acceptable on hot water return piping
3. Valves shall be provided with Buna-N, TFE or EPDM seats suitable for the service intended.
4. The pressure classifications for valves specified herein are working steam or water, oil, gas (WOG) pressure ratings.
5. Lever handles on all valves shall be color coded in conformance with ANSI Standard A-13.1

PIPE CLASS A11 **ITEM**	**2" AND SMALLER**	**2½" AND LARGER**
Pipe	Schedule 40 Carbon Steel ASTM A53 Grade B, A106 Grade A Or ASTM A120.	Schedule 40 Carbon Steel ASTM A53 Grade B, ASTM A106 Grade A Or ASTM A120.
Fittings	Screwed Malleable Iron 150 PSI.	Butt Weld Carbon Steel Schedule 40, ASTM A234.
Unions	Screwed 150# Malleable Iron ASTM A197 Grade II.	Use Flanges.
Flanges	150# Raised Face, Screwed, ASTM A197.	150# Raised Face Weld Neck ASTM A105
Valves		
Plug/Gas Cock	Apollo 70-100-07 series.	Iron Body, Greasable and Lubricated Tapered Plug, Flanged End, 175 Working Pressure. Nordstrom 143, Serck Audco LSW133GG, Walworth.
Solenoid	Amsco or Honeywell Skinner Valve U121xxxxx/432/Xxxxx With Coils, Printed Circuit And Other Parts For Intrinsic Safe Specifications Completely Encapsulated Within The Enclosure Using Epoxy Material. Operate At 24 VDC with an Intrinsic Safety Barrier.	
Ball	Bottom Loaded Pressure Stem. Valve Rated At 600 psi WOG. Watts B-6000-UL-Mass. Apollo 70 series, or Equal.	
Emergency Gas Shut-Off with Access Box	Metcraft A605 cabinet master gas valve box constructed of all heavy gauge stainless steel. Interior finish bead. Front flange and door polished to a satin finish. • Door connected using a continuous stainless steel piano type hinge. • Solid front w/ (s.s. construction) • Unit supplied with a quarter turn latch • Logos strip "Master Gas Valve" which is black bakelite tag with 1/2" high white letters and self adhesive Logo sent loose for installation in field. Gas Shutoff Ball Valve," T Handle Locks. Furnish And Install Approved Ball Valve As Specified Above.	
Check	150# Class, Bronze Swing Check Valve. Aluminum Disc, Screwed Cap, And Threaded Ends. Approved Equal To Eclipse Inc. Series 1000.	
Pressure Regulator Inlet Pressure Up to 2 psig	Provide a CSA design certified lever acting line pressure regulator where shown on plans. The regulator shall be in compliance with ANSI Z21.80, be a self-aligning valve with lever action for dead end lockup, and have an outlet pressure range of 7-11 inches W.C. The regulator shall be constructed of an aluminum casting with corrosion resistant internal parts and a nitrile rubber valve.	

PIPE CLASS A11 ITEM	2" AND SMALLER	2½" AND LARGER
	The regulator shall be Maxitrol or equal by Equimeter or Fisher Controls.	
Pressure Regulator Inlet Pressure 2 psig to 5 psig	Provide a CSA design certified lever acting line pressure regulator where shown on plans. The regulator shall comply with ANSI Z21.80 and be complete with an approved over-pressure protection devise (OPD) to limit downstream pressure in case of regulator failure. The regulator shall be a self-aligning valve with lever action for dead end regulator lockup with an outlet pressure range of 7-11 inches W.C. The regulator shall be constructed of an aluminum casting with corrosion resistant internal parts and a nitrile rubber valve. The regulator shall be Maxitrol or equal by Equimeter, or Fisher Controls.	
Gaskets	1/16" Red Rubber, Wire Inserted. 150# Raised Face and 125# Flatface Gasket.	

Notes:

1. Provide a branch ball valve and positive silent check valve on each pipe branch within each laboratory the gas pipe floor main to lab fixtures.
2. Provide Two Wrenches For Each Gas Cock Size.
3. Kitchen Solenoid Shall Be Wired To The Hood Suppression System By This Contractor. Field Verify Voltage Solenoid Valve Requirements With Kitchen Supplier.
4. The Contractor, At His Option, May Weld Piping Down To 1-1/4 If Permitted By Local Codes.
5. All Welders For Gas Piping Must Be Certified Per The Requirements Of Section 22000.
6. Where multiple gas regulators are installed, regulators shall be marked with a metal tag designating the building or areas being supplied
7. All buried and exterior natural gas piping shall be protected from corrosion per the MA State Plumbing and Fuel Gas code, NFPA 54 – 2002 and all local and state amendments. Corrosion protection shall be achieved by coating all buried and exterior natural gas piping with 3M Scotchkote Fusion Bonded Epoxy Coating 6233 in accordance with the manufactures recommended installation procedures.

PIPE CLASS A19 **ITEM**	**2" AND SMALLER**	**2 ½ " AND LARGER**
PIPE		
FITTINGS		
UNIONS	Use Flanges	Use Flanges
FLANGES	150# Raised Face, Butt Fusion Weld	150# Raised Face Butt Fusion Weld Neck ASTM A105 ASTM A181, Grade I.
VALVES		
PLUG/GAS COCK	Iron Body, Greasable And Lubricated Tapered Plug, Flanged End, 175 Working Pressure. Nordstrom 143, Serck Audco LSW133GG, Or Walworth Equal	Iron Body, Greasable And Lubricated Tapered Plug, Flanged End, 175 Working Pressure. Nordstrom 143, Serck Audco LSW133GG, Or Walworth Equal.
BALL	Bottom Loaded Pressure Stem. Valve Rated At 600 PSI Wog. Watts B-6000-UL-Mass Or Equal	-----
GASKETS	1/16" Red Rubber, Wire Inserted. 150# Raised Face And 125# Flatface Gasket	

NOTES:

1. Provide Two Wrenches For Each Gas Cock Size.
2. Transition To Steel Piping Shall Be Made On The Interior Of The Building And With Gas Company and Plumbing Board Approved Devices.
3. Adhere To Manufacturer's Requirements Regarding Fusion Of Joints And Pipe Burial.
4. Welder's certification for interior and exterior welding shall be included in product submittals.

2.02 PIPING AND MATERIAL SUNDRIES

A. Materials and equipment shall be of the best quality manufactured, new, unused and free from all defects. Piping and fittings shall conform to the latest ANSI, ASTM, and NFPA and AWWA Standards including latest amendments and shall be in conformance with state and local plumbing codes, material standards.

B. Each length of pipe, each pipe fitting, trap, materials and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.

C. Unions and Flanges

1. Unless otherwise specified herein, unions for copper and brass piping two inches and smaller shall be 125 pounds (steam working pressure) brass ground joint type. Larger than 2 inches in diameter shall be 150 pounds flat faced brass flanges conforming to ANSI Standard B16.24. Flanges shall have copper clad steel bolts and nuts and 1/16-inch minimum thickness red rubber full faced gaskets.

2. Where brass flanges and ferrous flanges are to be joined, ferrous flanges shall be full faced.

3. Mating of ferrous and non-ferrous flanges shall be separated with rubber gaskets (1/16-inch minimum thickness) and Teflon liners installed in the boltholes. Boltholes shall be drilled to receive the Teflon liners. Physical contact between the ferrous and non-ferrous flanges including the bolts, nuts, and washers will not be permitted.

D. Nipples

1. Close and shoulder nipples shall be of corresponding materials as specified for the respective piping system and shall be extra heavy.

2.03 HANGERS AND SUPPORTS

A. Hangers shall be installed, as required, to meet code compliance as to location/spacing and Manufacturer's Standardization Society (MSS) Standard Practice Bulletins SP-58 & 69.

B. Hanger material shall be compatible with piping materials with which it comes into contact.

C. Hangers shall be installed, in addition to the above, at all changes of direction (horizontal and vertical), valves and equipment connections. Hangers shall be located so that their removal is not required to service, assemble or remove equipment.

D. Horizontal runs may use band hangers up to 4" size. Piping larger than 4" shall be provided with Clevis type.

E. Vertical support shall be by means of riser clamps (anchors with split ring type allowable up to 2" size only) and adjustable pipe support with flange anchored to floor.

F. Where three or more pipes are running parallel to each other, factory fabricated gang pipe hangers with pipe saddle clips or rollers may be used in lieu of the hereinbefore specified hangers. These hangers shall be sized to provide for insulation protectors as hereinafter specified. Pipe saddle clips shall be not less than 16 gauge metal and shall be copper when installed with uninsulated copper piping. Where pipe rollers are provided for insulated copper piping, insulation protectors shall be provided at each set of rollers and filled with a section of heavy density fiberglass pipe covering.

G. Insulation protectors (shields) for horizontal piping shall be constructed of galvanized steel formed to a 180 degree arc and 12 inches long, 18 gauge for hangers 5 inches in size and smaller, 16 gauge for hangers larger than 5 inches in size.

H. Exposed rods, clamps and hangers shall be electrogalvanized coated.

I. Valve and piping supports, from the floor, shall be adjustable pipe support and complete with pipe standard and flange, anchored to floor.

1. Supports shall be installed at each control valve, riser tee or elbow and where any unsupported section exceeds 4'-0" in length measured along piping centerline and within 4’-0” off floor.

2.04 SLEEVES AND ESCUTCHEONS

A. All pipes passing through rated floors, walls, or partitions shall be provided with sleeves having an internal diameter with a minimum of one inch larger than the outside diameter of the pipe or insulation on covered lines.

B. Sleeves through outside walls shall be Schedule 40 galvanized steel pipe with a 150 pound galvanized steel slip on welding flanges, welded at the center of the sleeve and shall be painted with one coat of bitumastic paint, inside and outside.

C. Sleeves through masonry floors and interior masonry walls shall be Schedule 40, black, steel pipe. Sleeves through interior nonmasonry walls or partitions shall be 22 gauge galvanized sheet steel.

D. The sleeves through outside walls and slab on grade shall be provided with pipe to wall penetration closures. Seals shall be mechanical type of interlocking rubber links shaped to fill space between pipe and sleeve. Links shall be assembled with bolts to form a belt around the pipe with pressure plate under each bolt head and nut. After seal assembly is positioned, tightening of bolts will provide watertight seal. Determine the required inside diameter of each individual sleeve before ordering, fabricating or installing. The inside diameter of each sleeve shall be sized as recommended by the manufacturer to fit the pipe and to assure a watertight joint.

E. Sleeves through walls shall terminate flush with face of wall. Sleeves through floor walls shall terminate 1" above finished floor.

F. Required fire resistance of floors and walls shall be maintained where penetrations occur. Fire stopping at sleeves shall be installed per manufacturer recommendations. Fire stopping material shall be UL listed for the service and fire rating. Provide asbestos-free firestopping material capable of maintaining an effective barrier against flame, gases, and temperature. Provide noncombustible firestopping that is nontoxic to human beings during installation or during fire conditions. Devices and equipment for firestopping service shall be UL FRD listed or FM P7825 approved for use with applicable construction, and penetrating items.

1. Fire Hazard Classification:

a. Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less when tested in accordance with UL 723 or UL listed and accepted.

2. Firestopping Rating:

a. Firestopping materials shall be UL FRD listed or FM P7825 approved for "F" and "T" ratings at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected, except that "F" and "T" ratings may be 3 hours for firestopping in through-penetrations of 4-hour fire rated wall or floor.

G. Escutcheons shall be provided with a set screw to properly hold escutcheon in place and provided at all exposed floor and wall penetrations. Escutcheons on C.P. piping shall be chrome plated.

2.05 SEISMIC RESTRAINT

A. For each seismic restraint, provide certified calculations to verify adequacy to meet the following design requirements:

1. Ability to accommodate relative seismic displacements of supported item between points of support.

2. Ability to accommodate the required seismic forces.

B. Calculations shall be stamped by a Professional Engineer who is registered in the Commonwealth of Massachusetts and has specific experience in seismic calculations.

C. Seismic restraint shall be installed in accordance with the latest edition of the State Building Code.

1. Maximum distance between braces in the lateral direction shall be 30 feet for piping 2” and smaller and 40’ for piping 2-1/2” and larger.

2. Maximum distances between braces in the longitudinal direction shall be 80 feet.

3. Tops of risers shall be provided with 4-way braces.

4. Flexible couplings shall be provided within 12” of floor and wall non-frangible penetrations and within 24” of all building expansion joints.

5. Hangers closest to the sway bracing shall be installed with an extended rod to the piping to resist upward movement of the piping.

6. Seismic bracing for lateral and longitudinal bracing may be of the splayed wire (tension type), or pipe and fixed hanger (tension/compression type), and shall be complete with manufacturer’s recommended sizing, locations, and calculations. One system only (tension or compression / tension) shall be installed.

7. C-clamps for attachment to the building structure must be provided with retaining straps.

8. 4-Way bracing may be of the splayed wire type or fixed angle brace with U bolt.

2.06 GAS BOOSTER

A. Natural Gas Booster System

1. General

a. Furnish and install a Pre-Packaged Duplex Natural Gas Boosting System as shown on the plumbing drawings. The booster skid package shall be pre-wired, pre-piped and factory tested prior to shipment.

b. The system specified herein shall be a Pre-packaged Duplex GasCube VS Natural Gas Boosting System as manufactured by The Spencer Turbine Company of Windsor CT, local office 508-839-6157. The following items are included in the GasCube: Two (2) UL-Listed Hermetic Natural Gas Boosters, Expansion Joints, Inlet Pressure Switch, Plug Valves, Check Valves, Recirculation Valve, Gauges and Control Panel.

c. The booster system shall operate in an automatic fashion and without surge or undue vibration.

B. Detailed Description

1. Boosters

a. The UL-Listed Hermetic Gas Booster shall be a Model GL-0325-1/2-R of multistage centrifugal design built in overhung construction where the impellers are mounted on an extended motor shaft. It shall compress 5,400 ICFH of natural gas at differential (boost) pressure of 9 inches W.C. with inlet conditions of 70º F and 14.82 PSIA. The specific gravity of the gas is 0.6.

b. The pressure shall remain practically constant from the surge limit to the full volume rating while the power consumption shall increase in direct proportion to the volume of gas handled at operating speed. The gas booster performance and design shall be approved and listed by Underwriters Laboratories.

C. Motor

1. Each motor shall be capable of operating continuously in the natural gas environment. Each motor shall be rated at 1/2-hp and suitable for operation on 208 volts, 3 phase, 60 Hz current at 3500 RPM. The motor enclosure shall be explosion proof per NEMA Class-1, Division-1, Group-D classification with thermal overload protection.

D. Casing

1. Each casing shall be cylindrical fabricated steel construction. The enclosing heads shall be of similar metal, properly braced for strength. The inlet and outlet connections shall be flanged. Each casing shall be leak tight to 10-3 cc/sec. with drive fans and motor contained within the casing shell, requiring no shaft seals.

E. Impellers

1. The impellers peripheral speed shall not exceed 25,000 FPM. There shall be at least 1/8-inch clearance between each impeller and all stationary parts.

2. Impellers shall be fabricated from high strength aluminum alloy, and shall be attached to the shaft by a clamped or tapered bushing hub.

F. Deflectors

1. Each booster internals shall contain fabricated steel deflectors with properly curved guide vanes for directing the gas to each succeeding impeller.

G. Shaft and Bearings

1. Each motor shall have an oversized, extended shaft supported by two oversized, anti-friction grease lubricated bearings designed to absorb both thrust and radial loads. Each shaft shall be sized so that the rotating assembly shall operate at a minimum of 20% below the first critical speed.

H. Vibration, Pneumatic and Performance Test

1. Each motor and booster assembly shall be balanced for minimum vibration not to exceed 1.5 mils and shall be capable of operation throughout its design range without the need for hold down or mounting bolts. Each unit shall be given a complete factory performance test over its full range. The results of this test shall be comparable to ASME Code Test requirements.

2. A multiple orifice plate shall be installed on the end of a fabricated steel pipe section. For this test the pipe section will be at least one and one- half pipe diameters long and the same diameter as the blower outlet on which it will be installed. The outlet sections shall be sized for maximum velocity of 4600 FPM and 100% rated flow.

3. Pressure taps flush with the inside diameter of the test section shall be installed at least one-half pipe diameter before the orifice plate. Sharp-edged orifices shall be opened to the atmosphere, a few at a time, and pressure temperature, speed, voltage, amperage and kilowatt readings shall be recorded for each test point.

4. The air volume at each discharge pressure shall then be read from a calibrated orifice chart and this volume shall be multiplied by the number of open orifices. On request, certified performance curves shall be supplied showing the exact performance and efficiencies of each specific machine. Prior tests on similar or identical machines shall not be acceptable.

5. The Gas Cube Skid shall be pneumatically leak tested at 5.0 PSIG prior to shipment.

I. Flexible Expansion Joints

1. Flexible expansion joints, will be shall be installed on the inlet and discharge of each gas booster. Joints shall have a wire braid, suitable for natural gas service. Joints shall be of the same diameter as gas booster inlets and outlets and shall serve to isolate vibration transfer from gas booster to gas train piping.

J. Low Pressure Switch

1. A manual-reset type low supply pressure “cut-out” switch shall be installed in the common inlet piping of the GasCube. The switch shall be of a ventless type and

FM-Approved for natural gas service and shall act to shut down the booster system in the event supply pressure falls below 3.0 inches W.C. The switch shall contain a reset mechanism integral to the switch housing — resetting of switch solely from the control panel is not acceptable.

K. Pressure Gauges

1. Pressure gauges suitable for natural gas service and suitably scaled shall be factory installed on the GasCube inlet and outlet. Gauges shall include shut-off valves.

L. Inlet & Outlet Plug Valves

1. Full-flanged/full-open area type lubricated plug type isolating valves shall be factory-installed on the inlet & discharge of each gas booster. Valves shall be gas tight and approved for natural gas service. Valves will be of the same diameter as the gas booster inlet and discharge and shall serve isolate gas flow to and from each gas booster.

M. Recirculation Loop

1. A recirculation loop from the gas booster discharge to the inlet will be supplied. The recirculation loop will include a control valve, hand operated and designed for natural gas service.. The loop shall serve to insure a nominal amount of gas flow is maintained through the gas booster and that heat rise of gas is dissipated during low or no flow operation of the gas booster system.

N. M Integral Pressure Sensor/Transmitter

1. Skid shall include pre-wired and installed integral pressure transmitter/sensor combination and shall be capable of fully automatic operation and control of outlet pressure using factory programmed settings. Additionally, the skid shall be capable of automatic, continuous operation using P&ID control. Skid shall not operate using simple on/off control to regulate pressure and shall be capable of continuous operation without overheating or undue vibration.

O. CONTROL PANEL

1. NEMA 1 – Control Panel for the operation of one (1) Spencer Natural Gas GasCube Gas Booster. The GasCube Control Panel will be UL Stamped; built in accordance with UL508A Standards for Industrial Control Panels and shall include:

   a. One (1) Spencer supplied Variable Frequency Drive for ½-HP, 208 volt, three-phase, 60 HZ motor

   b. One (1) Spencer supplied, preprogrammed Human-Machine Interface with touch-screen interface and the following functionality

      HAND - Allows Manual Start/Stop of Gas Booster via Local Start/Stop Push Buttons
      OFF - Off
      AUTO - Allows Automatic Start/Stop of Gas Booster via remote signal (dry contact)

c. Loss of Power Sequencing - In the event of supply power loss to the Spencer Control Panel (SCP), the SCP shall "power up" automatically upon restoration of power.

HAND - Gas Booster has to be "Manually" Restarted
AUTO - Gas Booster shall "Automatically" Start if the remote dry contact from the process controls is maintained in the "closed" position (i.e.: calling for the Gas Booster to run)

d. Three (3) – Push Buttons / User Interface (UI) buttons

START - Manual Start of Gas Booster (Hand)
STOP - Manual Stop of Gas Booster (Hand)
RESET - Alarm Reset

e. Provisions (dry contact) for remote start/shutdown of Gas Booster via a signal from BMS or process controls

f. Provisions for a Low Inlet Gas Pressure Switch to shut down the Gas Booster, energize an Alarm Light or User Interface (UI) button on the Control Panel, and energize a Common Alarm Relay

g. Provision for a N.C. Motor High Temperature Switch to shut down the Gas Booster, energize an Alarm Light or UI button on the Control Panel, and energize a Common Alarm Relay

h. Elapsed run-time hour meter

i. Provisions for a Motor Starter Overload Function to shut down the Gas Booster

j. Provision (dry contact) to activate a remote alarm when panel common alarm is activated.

k. Provision to Automatically Re-Set Alarms upon restoration of power.

l. Miscellaneous components and hardware to assure proper functioning

2. All above items shall be factory assembled, pre-wired, pre-piped and factory mounted on a common factory furnished steel skid.

P. AUXILIARY GAS COMPONENTS

1. The following Auxiliary Gas Components shall be selected and provided by the gas booster manufacturer and shipped loose for field installation by contractor upstream and downstream of the Gas Booster Skid.

Q. Upstream Check Valve

1. The contractor shall install a 3-inch diameter full-flanged disc type check valve in a horizontal position in the gas main just upstream of the gas booster system inlet. The valve shall be UL-Listed or FM-Approved for natural gas service and shall serve to prevent reverse gas flow.

R. Gas Booster Downstream Gas Pressure Regulators

1. The contractor shall field install One (1) 3-inch flanged Line Pressure Regulators (PRV) selected and supplied by the gas booster manufacturer installed in a straight section of piping just downstream of the gas booster skid gas discharge

per manufacturer's instructions. The PRV shall be a direct-acting type with lock-up feature and shall be of vent-limited design approved for natural gas service. Each PRV shall be supplied with two (2) 3-inch flanged 100% open-area type area type lubricated plug isolation valves. The PRVs shall serve a maximum gas load of 4,929 CFH and shall provide constant delivery pressure of 9 to 10 inches W.C. during normal operation. A common discharge (delivery) pressure gauge shall also be provided.

S. START-UP

1. Contractor shall provide start-up service of the system by an authorized factory-trained manufacturer's representative. Start-up service shall include inspection of overall installation, initial start-up and running of the system, confirmation of all automated and alarm functions and operational and maintenance instructions to facility personnel.

T. WARRANTY

1. Manufacturer shall warranty to replace or properly repair equipment and materials in which defects develop within a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever occurs first.

PART 3 - EXECUTION

3.00 DEMOLITION

A. The existing facility will continue to operate during all phases of the demolition work and subsequent construction. No interruption of the plumbing systems will be permitted without prior approval of the Owner's Representative.

B. Submit proposed methods and sequence of operations for the selective demolition work to the Owner's Representative for review prior to the start of the work.

C. Perform all demolition while ensuring minimum interference with adjacent occupied areas.

D. Where sections of a system are to be removed and the system serves other areas of the building that are outside the scope of the work, perform the following:

1. Coordinate the temporary shutdown of the system with the Owner's representative.

2. Install supports in the remaining active sections of the system as required by the removal of nearby supports associated with the demolition.

3. Isolate the system.

4. Cap the remaining system section, leaving the remainder of the system active.

E. Provide temporary shoring or bracing during the demolition work to prevent movement, settlement, or collapse of the system or adjacent systems due to the work.

F. Promptly repair any damage caused to adjacent facilities or areas that are designated to remain at no additional cost to the Owner.

G. Equipment:

1. Coordinate with the Contractor and Subcontractors to provide disconnection prior to equipment removal.

2. Remove equipment by unfastening at the supports or attachments. Then remove the attachments from the building, leaving no component of the original installation.

3. The Owner shall choose to take possession of the equipment or not. If the Owner chooses not to take possession of the equipment, the Subcontractor shall remove the equipment and dispose of the equipment in accordance with Paragraph H specified below.

4. Exercise care with equipment that is to be relocated or turned over to the Owner, examine the equipment before removal in the presence of the Owner's representative to determine its condition.

5. Install relocated equipment to ensure no damage.

6. Equipment to be turned over to the Owner: Deliver to an on-site location designated by the Owner, and obtain acknowledgment of receipt in good condition.

H. All equipment, etc., not turned over to the Owner shall be become the property of the General Contractor, and shall be removed from the site and be properly disposed of.

3.01 IDENTIFICATION

A. General

1. All piping, equipment, control panels, and valves furnished and/or installed under this Section of the Specifications and shall be marked for ease of identification.

2. Code 39 shall be the bar code format unless designated differently by the Owner’s facility group. The Contractor shall create the required bar codes and assign numbers based upon input from the Owner’s facility group. The Contractors shall create a database of all equipment, panels and valves for Owner’s review and approval.

3. Equipment, panel, and valve labels shall be 4” by 2½” and designed to withstand temperatures of -22°F to +392°F. Labels are designed to be resistant to water, acid/solvent, dirt and oil repellant. Labels shall be high tensile Graphiplast® tearing strength as well as scratch resistant and affixed to equipment by cable ties or adhesive clear pouch. Location of label shall be at unit control panel, next to factory nameplate, lower right-hand corner of panel, and/or tie wrapped to localize disconnect at unit. Installation instructions shall be provided with the labels to assure durability (i.e., clean surface prior to adhering adhesive label, leave cable ties loose on outside of equipment to allow freedom of movement due to the elements, etc.) and with adhesive tags not secured when temperatures are below 45°F ambient temperature. Outside equipment shall have two bar code labels. One on the exterior and one inside the unit in a safe location.

4. Samples of stickers together with color schedules shall be submitted during the submittal phase of this project.

5. Marking shall be done using self-adhering (screw or rivets for equipment) labels applied to clean, smooth surfaces. All lettering shall have sharply contrasting background for ease of identification. Colors shall be in accordance with ANSI A13.1 Standards. Samples of stickers together with color schedules shall be submitted for approval.

B. Pipe Identification

Provide color-coded pipe identification markers on all piping in the building installed under this section.

1. All pipe markers shall be as manufactured by W.H. Brady, Westline Products, Seton Nameplate Company or approved equal. Stenciling of the piping will not be permitted. Pipe markers, bands and flow arrows shall be pressure adhesive, snap-on, acrylic or vinyl type.

2. Furnish and affix approved adhesive bands identifying the service and direction of flow of each piping system installed under this Section of the Specifications.

3. Name of the service, taken from drawing legend, shall be printed in black letters, not less than 1 ¼ inches high for piping, including covering, 3 inches and larger and ¾ inch in height for piping 2-1/2 inches and smaller.

4. Arrows and color band background shall conform to State Plumbing Code for all domestic and protected water systems. Legends, arrows and colors shall conform to ANSI Standard A13.1 covering “Identification of Piping Systems” for all other systems.

5. Identification shall be provided on all piping that is exposed as well as all in concealed locations such as shafts, and above removable ceilings in which piping may be viewed.

6. Each set shall consist of one band on which the name of the service is printed and one band on which is printed a black directional arrow.

7. Bands shall be applied where they can be easily read from the finished floor below, with their long dimension parallel to the axis of the pipe.

8. Bands shall be applied only after any finish painting is completed.

9. In general, the piping of each system shall be identified in the following locations and the piping designation shall be taken from the legend as indicated on the drawings.

    a. Pipe mains and branches – every 25 feet in all accessible open areas and ten feet apart in congested areas.

    b. At each side of valves and pipe tees.

    c. Each wall penetration (both sides).

    d. At each piece of equipment.

    e. At each floor, above and below ceilings, on exposed risers and drops.

10. The following color coding shall be used with names in black letters on backgrounds indicated:

SCHEDULE OF PIPING IDENTIFICATION		
Service	**Legend**	**Background Color**
Gas	Natural Gas	Yellow
Non Potable Cold Water	Non Potable Cold Water	Yellow

C. Equipment

1. Each item of equipment including controls, not provided with a manufacturer's nameplate shall be identified by this Contractor with a permanently attached nameplate.

2. Equipment marking shall be prominently located on each normally visible side of equipment. Equipment intended for installation in finished areas shall have markings located behind normally used access panels mounted so as to be readily found.

3. Equipment identification designations shall be taken from equipment schedules and coordinated with the Owner's facility group to assure designations match up with Owner's maintenance management system identification database.

4. Nameplates, catalog numbers and rating identification shall be securely attached to electrical and mechanical equipment with screws or rivets. Adhesives or cements will not be permitted.

D. Valve Tags

1. All valves on pipes of every description shall have numbering tags. The valve numbers shall correspond with numbers indicated for valves and controls on two-printed Valve Lists prepared using electronic database by the HVAC subcontractor. These printed lists shall state the numbers and locations of each valve and the fixture or group of fixtures which it controls, and other necessary information, such as requiring the opening or closing of another valve when one valve is to be opened or closed.

2. Provide flow diagrams showing all valves. Use the Valve List for callouts of all valves on the flow diagrams, prepared in a form to meet the approval of the Architect. Include this info in the operating and maintenance (O&M) manuals, and, for all mechanical rooms, provide the information laminated, mounted and framed under glass at the direction of the Owner. All valve interior diameters shall be shown in the O&M manuals and on the final Record Drawings.

3. Furnish and install bar coded tags for valves (including control valves – coordinate with controls Contractor for info) using a 4-inch by 2½-inch bar coded label/tag. Each label/tag shall have its appropriate bar code (Code 39 Standard) directly below the valve number. Label shall include valve and actuator (for control valves) manufacturer, model number, serial number, and manufacturer's web site. The number of the valve and the service shall be as indicated on the "Valve List". See paragraph below for additional bar code labeling requirements.

4. Valve tags shall have neat circular black and white laminated fibre-engraved white showing through tags of at least 1 ½" in diameter, attached with a brass hook to each valve stem. Stamp on these valves tags in letters, as large as practical, the number of the valve and the service such as indicated on the "Valve List". The numbers on each service shall be consecutive. All valves on tanks

and pumps shall be numbered by 3" black and white laminated fibre-engraved white showing through discs with white numbers 2" secured to stem of valves by means of brass hooks or small solid link brass chain.

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Prior to completion of the Contract, provide field operating instructions to the Owner's designated representative with respect to operation functions and maintenance procedures for the equipment and systems installed.

B. All equipment provided under this Section of the Specifications shall be placed in operation and shall function continuously in an operation test for a period of one week, without shut down due to mechanical failure.

C. Prior to scheduling the project final inspection and after completion of the entire installation period, provide all work required to adjust all controls, hot water systems balancing and all maintenance to place the systems in operation to meet the requirements of this Section of the Specifications and Contract Documents.

D. Provide to the Owner through the Engineer, six (6) complete sets of operating, service, maintenance instruction manuals containing replacement data for the equipment which will require operating, maintenance or replacement and one copy of this literature shall be available during the instruction of the operating personnel while the others are checked for completeness by the Architect.

E. Sufficient advance notice shall be given to the Owner's designated operating personnel for the specific instruction period. Upon completion of instruction, obtain from the representative(s) written verification that the above mentioned instruction has been performed. Such verification shall be forwarded to the Owner through the Architect.

F. Each copy of the approved operating and maintenance manual shall contain copies of approved shop drawings, equipment literature, cuts, bulletins performance charts, pump curves, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed and bound in a hard-back three ring binder. Flysheets shall be placed before instructions covering each section. The instruction sheets shall be in 8-1/2 inches by 11 inches with large sheets of drawings folded in neatly. Each manual shall have the following minimum contents:

1. Table of Contents

2. Maintenance

    a. Maintenance and lubricating instructions

    b. Replacement charts

    c. Preventive maintenance recommendations

    d. Trouble shooting charts for equipment components

    e. Testing instructions for each typical components

    f. System draining and filling instructions

g. Two typed sets of charts indicating equipment tag number, location of equipment, specific equipment service, greasing and lubricating requirements as recommended lubricant type and intervals of lubrication.

h. Two type sets of instructions for ordering spare parts. Each set shall include name, telephone number and address of where they may be obtained.

3. Manufacturer's Literature

a. The equipment for which shop drawings have been submitted and approved.

b. Wiring diagrams

c. Installation drawings

d. Manufacturer's representative and contract information

e. Guarantees

3.03 CLEANING AND ADJUSTING

A. Cleaning and Adjusting

1. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by operation of the system for testing.

2. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishings, due to this Contractor's failure to properly clean the piping system shall be repaired by this Contractor at no increase in Contract costs.

3. At the completion of the work, all water systems shall be adjusted for quiet operation.

4. All automatic control devices shall be adjusted for proper operation.

5. All plumbing fixtures and exposed metal work shall be adjusted for proper operation. Floor drain strainers and traps shall be cleaned of all debris.

6. All items of equipment shall be thoroughly inspected and any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match the original finish. All items so repaired and refinished shall be brought to the attention of the Architect for inspection and approval.

3.04 SPECIAL TOOLS

A. Provide any and all special tools, recommended by the manufacturer of items furnished, noted as not being commonly available.

3.05 CERTIFICATES OF APPROVAL

A. Upon completion of the work, furnish to the Owner through the Architect, in duplicate, certificates of inspection and/or approval from state and local inspection authorities having jurisdiction indicating the installed systems compliance to their requirements.

3.06 QUIET OPERATION

A. All work provided under this Section of the Specifications shall operate under conditions of load without sound or vibration, which is abnormally objectionable for such equipment in the opinion of the Architect. In case of moving machinery, sound or vibration noticeable outside of the room in which it is installed, or annoyingly noticeable inside its own room will be considered objectionable shall be corrected in an approved manner by this Contractor at no change in Contract amount.

3.07 SYSTEMS

A. Natural Gas Systems

1. All piping shall be cut accurately to measurements obtained at the site and shall be installed without springing or forcing due to inaccurate measurements or improper hanger installation

2. Every branch line from a main shall be furnished with a branch valve (no exceptions) and shall be taken off the top of main using such fittings as may be required by structural obstructions or other installation conditions. All service pipes, fittings, and valves shall be kept at sufficient distance from other work to permit not less than 1 inch between finished coverings on other service piping.

3. All piping shall be supported independently and securely fastened to the building structure with appropriate anchors and pipe hangers. In general, all lines shall be installed above ceilings in finished spaces.

4. All piping shall be cut true and threaded or welded. Cap all open ends of piping to prevent the entrance of debris when work on this system is complete or the work day has ended.

5. All pipes shall be run parallel and graded evenly to low points. A serviceable drip leg of at least six inches in length shall be provided at each low point, at every connection to a piece of equipment, and at the base of each riser.

6. All exterior gas piping, valves and fittings shall be protected and covered with Tapecoat H35 Gray corrosion protection tape with integral primer and adhesive. All fittings and joints shall be wrapped with similar protective tape.

7. For gas installations of over 5,000,000 (five million) BTU/HR, submit a plan of the proposed piping system and equipment for approval to the local Gas Inspector. A letter from the servicing gas supplier indicating that the fuel supply is available shall accompany the submission. Gas utilization equipment over 12,500,000 BTU/HR, water tube boilers having outputs of 10,000 pounds of steam per hour or more, gas booster installations, cogeneration systems, and kilns, shall be submitted to and approved by the Board of State Examiners of Plumbers and Gas Fitters.

8. Provide valved pressure gauge assemblies at each main gas service entrance, at each water heater, boiler, emergency or standby generator, incinerators, HVAC rooftop units and all other major pieces of equipment utilizing gas. Each pressure gauge assembly shall be individually valved, include a snubber and shall have a dial range that would locate the system pressure as close to the approximate mid-point on the dial range as possible. Assembly shall be similar to TRERICE Model 760B, 2-1/2 inch diameter gauge, 735-2 valve and 872-1 snubber.

9. Piping system shall be purged with 100 psi compressed air to remove dirt and debris.

10. Pressure test gas piping system with air, carbon dioxide or nitrogen pressure test at not less than 10 psi gage for a period of 24 hours with no decrease in pressure. For welded piping and for piping carrying gas at pressures exceeding 14-inches of water column pressure, the test pressure shall be at least 60 psig for a period of 24 hours with no decrease in pressure. If a decrease in pressure is detected, soap or bubble test joints for leaks, repair or replace as required, and retest.

11. Gas piping connections to all equipment shall include a gas shutoff valve, drip leg, union fitting and pressure gauge as well as a swing joint consisting of at least two 90 degree elbows at all HVAC equipment.

3.08 PATCHING, REPLACEMENT AND MODIFICATION OF EXISTING WORK

A. After installation of pipe lines, neatly patch, repair, and replace existing work where damaged, removed or altered for pipe line installation. This work shall be similar and equal in quality to the work removed or damaged, unless otherwise shown or specified. Such work shall include replacement of existing lines at points of connections to new lines, patching of masonry work, and wherever any such patching work is indicated on drawings or otherwise required.

3.09 GENERAL INSTALLATION REQUIREMENTS

A. Piping Installation

1. Install piping approximately as shown on the drawings and as directed during installation by the General Contractor or the Architect.

2. Piping shall be installed as straight and direct as possible forming right angles or parallel lines with building walls, other piping and neatly spaced.

3. The horizontal runs of piping, except where concealed in partitions, shall be installed as high as possible.

4. Piping or other apparatus shall not be installed in such a manner so as to interfere with the full swing of the doors and access to other equipment.

5. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the drawings shall be followed as closely as possible, but the right is reserved by the General Contractor or the Architect to change locations and elevations to accommodate the work, without additional compensation for such change.

6. Screwed piping of brass or chrome plated brass shall be made up with special care to avoid marring or damaging pipe and fitting exterior and interior surfaces.

7. Small fittings shall be screwed up close to the shoulders of male threads. Lampwick, cord, wool, or any other similar material shall not be used to make up thread joints.

8. Screwed pipe and copper tubing shall be reamed smooth before installation.

9. Reducing fittings, unless otherwise approved in special cases, shall be provided in making reduction in size of pipe. Bushings will not be allowed unless specifically approved.

10. Vertical risers shall be firmly supported by riser clamps, properly installed to relieve all weight from the fittings.

11. Any piece of pipe six inches or less in length shall be considered a nipple.

12. The pipe and fittings shall be manufactured in the United States of America and in accordance with the Commercial Standards, American National Standards Institute and American Society of Testing Materials.

B. Specialty Installation

1. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

2. Install vent caps on each vent pipe passing through roof.

3.10 GAS SERVICE, BOOSTER VENTS AND PIPING

A. Piping shall be done by licensed gas fitter (as required by Code).

B. Gas piping shall pitch to drain and shall have drip pockets at least 6" long with removable caps at low points. Branch connections shall be taken from top or side of horizontal running main. Provide gas cock or valve on connections to fixtures or equipment.

C. Provide pressure reducing valve between meter and building piping, as required by Gas Company, piped and vented to outside of building.

D. Provide individual vents from regulators, pressure switches and reliefs on factory packaged equipment gas trains at all equipment located on this system. It is this contractor's responsibility to extend all vents to atmosphere terminal at a safe location in conjunction with the fuel gas code.

E. Gas piping and safety devices shall meet requirements of NFPA No. 54 and shall be subject to inspection and approval of State Gas Regulatory Board.

F. Special Note: Provide aluminum check valves on all gas pipes that enter rooms where compressed air is installed or when both compressed air and gas piping connect to the same piece of equipment. This is required in all areas where gas and air are present.

G. Provide a gas cock valve at each branch run out from main or riser serving gas outlets. This shall include all branches from the gas main and further branches from gas sub-mains. These requirements will be strictly enforced by the local plumbing inspector. This requirement shall take precedent over general arrangement drawings. Therefore the following is called for:

1. Provide a gas shutoff valve at each Tee on both outlets of the Tee in a run of piping

2. Provide a gas shutoff valve at each piece of equipment

3. Gas valves or cocks shall not be concealed and shall be readily accessible for inspection and repair

4. Provide union connection between shut-off cock and equipment to permit disconnection of equipment

H. Piping shall be securely fastened, separately hung and shall not support any other weight or piping. Piping dropping in concrete block walls shall be factory wrapped for corrosion protection.

I. Welded piping shall conform to the latest requirements of the Massachusetts Fuel Gas Code.

3.11 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in General Specification sections for Vibration and Seismic Controls for Plumbing Piping and Equipment

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.

2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

F. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.

G. Install hangers for vertical PEX piping every 48 inches.

H. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.

2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.

3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

4. NPS 6: 48 inches with 3/4-inch rod.

5. NPS 8: 48 inches with 7/8-inch rod.

I. Install supports for vertical PVC piping every 48 inches.

J. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

K. Hanger Installation

1. All piping shall be supported from the building structure by means of approved hangers and supports, to maintain proper grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.

2. Maximum spacing of hangers on runs of pipe (vertical and horizontal) having no concentration of weight shall be as follows:

S C H E D U L E			
MATERIAL	Steel	Copper	PVC
Pipe Size (Inches)	Hanger Spacing in Feet/Pipe		
.50	6	6	3
.75	8	6	3
1.00	10	6	3
1.25	10	10	3
1.50	10	10	3
2.00	10	10	4
2.50	10	10	4
3.00	10	10	4
3.50	10	10	4
4.00	10	10	4
5.00	10		4
6.00	10		4
8.00	10		

3. Maximum spacing of hangers on soil pipe shall be five feet or at each fitting on straight lengths to maximum of 10' and hangers shall be provided at either side of all changes in direction. Vertical Hanger rods to support piping from the structure or supplementary steel shall not exceed four feet in total length vertically, provide factory fabricated channels and all associated accessories.

4. Friction clamps shall be installed at the base of the plumbing risers and at each floor (above or below floor slabs). Friction clamps installed above floor slabs shall not be supported from or rest on floor sleeves.

5. Provide hangers at a maximum distance of two feet from both sides of all changes in direction (horizontal and vertical), on both sides of concentrated loads (equipment) and at valves.

6. Hangers, in general, for all horizontal piping shall be A Band type hangers for piping up to 4" size and Clevis type for piping 5" and larger. These hangers shall be sized to fit the outside diameter of the pipe insulation protectors (sheet metal shields) specified herein. Gang type hangers may be used for supply piping up to 3" size where applicable and in conformance with manufacturer's recommendations.

7. All vertical drops and runouts including insulated pipes shall be supported by split ring hangers with extension rods and wall plates or stamped type up to 2" size only.

8. Provide on all horizontal insulated lines, pipe covering protectors (shields) at each hanger. Each protector shall be sized to fit the outside diameter of the Pipe insulation.

9. Lock nuts or retaining straps shall be provided with all beam clamps.

10. All supplementary steel including factory fabricated channels and associated accessories, including 12 inch long sheet metal shields, throughout both suspended and floor mounted shall be provided by this Contractor and shall be subject to the approval of the Architect.

11. Hangers shall not pierce the insulation on any insulated pipe except when prior approval is given.

12. Wire, tape or wood fastenings for shims or support of any pipe or tubing shall not be used.

13. Remove all rust from the ferrous hanger equipment (hangers, rods, and bolts) and apply one coat of red lead immediately after erection.

14. Piping at all equipment and each control valve shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping and equipment shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.

15. All piping shall be independently supported from the building structure and not from the piping, ductwork, conduit or ceiling suspension systems of other systems.

16. Installation of hangers which permit wide lateral motion of any pipe will not be acceptable.

17. All hangers in contact with uninsulated piping shall be compatible with piping material.

L. Pipe Covering Installation

1. Before pipe covering is applied, all pressure tests shall have been performed and approved.

2. Pipe covering shall be applied over clean, dry surfaces.

3. Pipe covering shall be continuous and shall be carefully fitted with side and end joints butted firmly and tightly together finished as specified herein.

4. Pipe covering and auxiliaries shall be kept dry during storage and application.

5. Adhesives, cements and coatings shall not be applied when the ambient temperature is below 40 degrees Fahrenheit.

6. Valve bodies shall have covering applied up to the stem.

7. It is the intent of this Specification that all vapor barriers be sealed and be continuous throughout. Staples shall not be used on vapor barrier jackets.

8. Where pipe-covering ends occur at equipment or fixtures, end caps on the covering shall be provided.

9. Adequate operating clearances shall be provided at control mechanisms.

10. Pipe covering for flanges shall overlap the adjoining pipe by a minimum of three inches on each side.

11. Pipe covering shall be provided on all piping passing through ceilings and through the interior above ground sleeves (wall and floor).

12. All voids and or seams in insulation shall be filled with insulating cement and finished as specified herein.

13. In the event staples are used, they shall be coated with a vapor barrier mastic after insulation and taped. These staples shall not be visible on finished installation.

14. End joints of each section of the installed pipe covering shall be tightly butted.

M. Installation of Sleeves, Inserts and Escutcheons

1. Sleeves in floors shall set one (1) inch above the finished floor surface or as indicated on the Architectural Drawings.

2. Sleeves through interior masonry or non-masonry walls or partitions shall be set flush with the finished surfaces of the wall or partition.

3. Provide field drilling for inserts required for work under this section of the specifications.

4. Each interior wall or floor sleeve shall be firestopped to provide equivalent fire resistance to floor or wall penetration.

5. Escutcheons shall be installed around all exposed insulated or bare pipe, passing through a finished floor, wall or ceiling. Escutcheons shall fit snugly around the bare or insulated pipe.

N. Valve Installation

1. Location of Valves: There shall be valves where indicated on the drawings and where specified as follows:

a. At building service entrances, all supply risers, branches to groups of fixtures, branches to separate fixtures, equipment, wall hydrants, hose

bibbs, connections to other systems and sectionalizing points in each system.

b. Each fixture supply shall have a separate angle stop or straight stop finished like the pipe it services.

c. Each piece of equipment shall have isolation valves for each service connected or at inlet and outlet of equipment with single service.

d. At the low points of each water system including trapped sections, provide a tee with 1/2 inch branch and ball valve with 3/4 inch hose end vacuum breaker and attached chain with cap.

e. Valves shall be located to permit easy operation, replacement or repairs.

3.12 VALVE INSTALLATION

A. General valve installation requirements are specified in 220000 Plumbing and Piping Systems

3.13 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

C. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.14 FINAL DOCUMENTATION (DRAFT FOR MA PROJECTS)

A. Upon completion of work and prior to request for Certificate of Occupancy, issue a certificate stating that work has been installed generally consistent with construction documents in accordance with 780 CMR, 8th Edition. All submittals, as-builts, O&M manuals, and balancing reports are to be provided for engineer's review, prior to request for engineer's completion certificates. In addition, and also prior to request for completion certificates, all punch list items must be completed to the satisfaction of the engineer. Verify that all sequences of operations and controls have been incorporated and all systems and equipment are working per the sequences of operations as dictated by 780 CMR, Chapter 13. A blank Contractor's certificate form can be furnished by RDK upon request.

END OF SECTION

PART 4 - ATTACHMENT A (FACILITY SUPPORT SERVICES FORM)

FACILITY SUPPORT SERVICES

Alpha-Numeric Equipment System Identification

Date: _____

Contractor: _____ **Phone:** _____ **Data#:** _____
Prepared By: _____ **Phone:** _____
Installing Contractor: _____ **Phone:** _____

___ New **___ Revision**

EQUIPMENT IDENTIFICATION, LOCATION, & SPECIFICATION

Alpha Numerical Code **Equipment Sequential No.: ___ - ___ - ___ -- ___ - ___ - ___**	Equipment Type No:	**Equipment Type Description:**

Organization/Service:	**Building:**	**Floor/Level:**	**Date Started:**
O & M Instruction Videotape Yes__ or No __ **Submitted Date: ___/___/_____**	**Department** **Cost Center No.:**	**Special Safety Instructions:** **Yes___ or No ___** **Attached?** **Yes___ or No ___**	
Equipment Systems or Area Served:	**Vendor No.:**	**Mfg Company:**	
Model No.:	**Serial No:**	**Other Information:**	

Volts 1: ___ Volts 2: ____ **Amps 1: ___ Amps 2: ____**	**Phase: ____**	**Capacity/Size:** CUFT/TONS/LBS/#HR/CFM _____SQFT/GALS/CUIN/SQIN/RPMS	**Power:** LBS*HR/BTUs/KVAs/ BHP _____HP/TONS /WATT/KWs

Part No./Type No./Class No.:	**Output or In/Out Ranges:** LOW/IN:_____ HI/OUT:_____	**Unit:** RPM/DEG/Hz CFM/GPM/PSI/VAC	**Belt Sizes:**
Filter No. 1:	**Filter No.2:**	**Fuel/Oil No./Lube No./Refrigerant No.:**	
Bearing Part No.:	**Control Part No.:**	**Misc./Electrical/Mechanical:**	
Installation Year: _____	Projected/Estimated Equipment **Life Expectancy:_____ (Est. Yrs.)**	**Est. Equipment Life Remaining:**	**Warranty Exp. Date:** **_____/_____/____**

PM ASSIGNMENT

Other Information:	Predictive Maintenance Yes __ or No ___	Special Instruction *(Use Comments)* Yes ___ No ___	Task Risk & Priority Codes EM / UM / LS / FM / MI / ME:

PRIMARY MONTHS for PM:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PRIMARY WEEKS for PM:	1-5	6-9	10-13	14-18	19-22	23-26	27-31	32-35	36-39	40-43	44-48	49-52

PM FREQUENCY CODES: AN - Annual 2X - Semiannual QT: Quarterly 6X - Bi-Monthly MO: Monthly WK - Weekly

Comments:

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SECTION 230001

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.00 GENERAL PROVISIONS

A. The GENERAL REQUIREMENTS, DIVISION 1, and BIDDING AND CONTRACT REQUIREMENTS, and DIVISION 0 are hereby made a part of this Specification Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 SCOPE OF WORK

A. This project includes an occupied elementary school.

1. Work includes the removal of fourteen (14) existing cast iron steam boilers, boiler feed system and piping. New work includes the installation of three (3) new vertical steel gas fired steam boiler and replacement of existing header and valves, new boiler feed system and reconnection of gas piping and breeching. Work also includes new boiler feed tank and pumps, condensate transfer tank and pumps and boiler blow down tank.

B. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:

1. Piping and Fittings (all systems and types) including submitting sizing where called for on the drawings or in these specifications
2. Pipe Hangers and Supports
3. Identification
4. Sleeves, Firestopping
5. Pipe Expansion Joints, Guides and Anchors
6. Valves and Accessories (all types)
7. Steam Traps
8. Pressure Gauges, Thermometers, Accessories
9. Boiler Feed Units
10. Condensate Transfer Unit
11. Electric Motors and Starters
12. Boiler/Burner Units
13. Equipment Nameplates
14. Factory Tests

15. Vibration Isolation

16. Ductwork

17. Louvers

18. Fans

19. Factory Painting

20. Insulation

21. Chimneys, Stacks, and Flues

22. Operating and maintenance instructions and manuals

23. Coordination drawings

24. Shop drawings

25. Cleaning, Testing, Adjusting, & Balancing of all Ducted and Piped Systems and Equipment

26. Record (as-built) Drawings

27. HVAC Control Systems

28. Seismic Restraints

29. Training of Owners Personnel on Equipment, Systems, and Controls

C. The work to be done under this section is generally shown on the Mechanical HVAC Drawings.

1.02 RELATED WORK

A. Principal classes of Work related to the Work of this Section are listed below, and are specified to be performed under the indicated Sections of these Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. It is the responsibility of the Contractor to coordinate the Work of this Section with that of all other trades.

B. The following work is not included in this section and will be provided under other sections, except as specified herein:

1. Electrical power wiring for all HVAC equipment and to junction box(es) in mechanical areas. Power wiring from these box(es) to all control equipment (control panels, etc.) and all controls/interlock wiring shall be provided by the controls Contractor. Control wiring shall be from standby power source (if available).

2. Starters and variable speed drives that are not integral to equipment, unless specified otherwise.

3. Structural supports necessary to distribute loading from equipment to roof or floor.

4. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing. Refer to Division 1, General Conditions.

5. Outdoor air intake and exhaust louvers.

6. Concrete work including concrete housekeeping pads and blocks for vibrating and rotating equipment, and cast-in-place manholes.

7. Flashing of roof and wall penetrations.

8. Painting.

1.03 PRODUCTS FURNISHED, BUT NOT INSTALLED UNDER THIS SECTION

A. None.

1.04 PRODUCTS INSTALLED, BUT NOT FURNISHED UNDER THIS SECTION

A. None.

1.05 DEFINITIONS

A. As used in this Section, the following terms shall be understood to have the following meaning:

1. "**Contractor**," or "**Subcontractor**," unless otherwise qualified, shall mean the installer of the work specified under this Section, and shall be responsible for coordination of this work with the work of the ATC Contractor.

2. "**Furnish**" shall mean purchase and deliver to the project site, complete with every necessary appurtenance and product support.

3. "**Install**" shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.

4. "**Provide**" shall mean furnish and install.

5. **"Work"** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.

6. "**Concealed**" shall mean hidden from sight in chases, furred in spaces, shafts, embedded in construction, in a crawl space, and above hung ceilings.

7. "**Exposed**" shall mean not installed underground or concealed as defined above.

8. "**Furnished by others**" shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.

9. "**Owner's Representative**" shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.

10. "**Date of Substantial Completion**" shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy

purposes. The GENERAL REQUIREMENTS, DIVISION 1, shall supercede this definition where specifically defined.

11. "**Piping**" shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.

12. "**ATC**" shall mean Automatic Temperature Controls, and shall be interchangeable with "**BAS**" (Building Automation System).

1.06 CODES, REFERENCES AND PERMITS

A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, and any other Codes and Regulations having jurisdiction including but not limited to:

1. All Applicable NFPA Standards

2. State and Local Building Mechanical, Electrical, and Energy Codes

3. American Society of Mechanical Engineers (ASME)

4. American Society of Testing and Materials (ASTM)

5. American National Standards Institute (ANSI)

6. Underwriters' Laboratories, Inc. (UL)

7. Occupational Safety and Health Administration (OSHA)

8. Any other local codes or authorities having jurisdiction.

B. Heating and pumping systems shall be installed by Contractors and personnel appropriately licensed in the State (Installing Contractor).

C. All pressure vessels shall conform to ASME and State codes and regulations.

D. All equipment shall meet the more efficient requirement:

1. As shown on bid documents,

2. Minimum efficiencies state in ASHRAE 90.1-2007, or

3. Minimum efficiencies stated in the governing Energy Code.

E. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:

1. Air Conditioning and Refrigeration Institute (ARI)

2. Air Diffusion Council (ADC)

3. Air Movement and Control Association AMCA

4. American Boiler Manufacturers Association (ABMA)

5. American National Standards Institute (ANSI)

6. American Petroleum Institute (API)
7. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE)
8. American Society of Mechanical Engineers (ASME).
9. American Society of Testing and Materials (ASTM)
10. American Welding Society, Inc. (AWS)
11. Associated Air Balance Council (AABC)
12. Certified Ballast Manufacturers (CME)
13. Copper Development Association (CDA)
14. Cooling Tower Institute (CTI)
15. Expansion Joint Manufacturers Association, Inc. (EJMA)
16. Factory Mutual System (FM)
17. Illuminating Engineering Society (IES)
18. Institute of Electrical and Electronics Engineers (IEEE)
19. Insulated Cable Engineers Association (ICEA)
20. Manufacturer's Standardization Society of the Valve & Fitting Industry (MSS)
21. National Electrical Contractors Association (NECA)
22. National Electric Manufacturers Association (NEMA)
23. National Environmental Balancing Bureau (NEBB)
24. North American Insulation Manufacturer's Association (NAIMA)
25. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)
26. The Hydronics Institute (HI)
27. Thermal Insulation Manufacturer’s Association (TIMA)

F. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.

G. The date of the code or standard is that in effect at the Bid date.

H. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner’s Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner’s Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.07 GENERAL REQUIREMENTS

A. Nameplates

1. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, type or style, model number, catalog number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

B. Maintenance Information

1. Systems and equipment which require periodic maintenance to maintain efficient operation shall be furnished with complete necessary maintenance information. Required routine maintenance actions, as specified by the manufacturer, shall be stated clearly and incorporated on a readily accessible label on the equipment. Such label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product.

C. Equipment Guards

1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

1.08 MATERIAL AND EQUIPMENT STANDARDS

A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner’s Representative.

B. Substitutions (approved equals) may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. In order for Requests for substitution to be considered, all must be submitted for pre-approval of manufacturer within 30 days of award of contract. All requests must be accompanied by a list of minimum 5-year-old successful installations of similar scope (with Owner contact and phone number), complete specifications together with drawings or samples to properly appraise the materials, equipment or process. Allow 30 days for Owner’s Representative’s review.

C. If a substitution of materials or equipment in whole or in part is made, this Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.

D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

1.09 SUBMITTALS

A. Conform to the requirements of Division 1, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractors and shall note the name(s), license number(s) and license expiration date(s) of the Contractor(s) installing the heating and pumping systems.

B. Definitions:

1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.

2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:

   a. Meet all performance criteria listed in the schedules and outlined in the specifications. For example, to be acceptable, a fan must deliver equal CFM against equal external static pressure using equal or less horsepower as listed in the schedules.

   b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will fit within the available space – this determination is solely the responsibility of the Contractor.

   c. For equipment mounted in areas where structural matters are a concern, the products must have a weight no greater than the product listed in the schedules or specifications.

   d. Products must adhere to all architectural considerations including, but not limited to: being of the same color as the product scheduled or specified, fitting within the architectural enclosures and details.

C. Submittal Procedures, Format and Requirements

1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.

2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:

   a. Title.

   b. Equipment number.

   c. Name and location of project.

   d. Names of Owner, Engineer and Seller.

   e. Names of manufacturers, suppliers, vendors, etc.

   f. Date of submittal.

   g. Whether original submittal or resubmitted.

3. Shop drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum ¼" = 1' scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary.

4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.

5. Provide shop drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.

6. Provide complete data for all auxiliary services and utilities required by submitted equipment. This shall include power and cooling water requirements and points of connection.

7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces.

8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.

9. The Owner's Representative shall approve all materials before commitment for materials is made.

D. Product Data: Submit complete manufacturer's product description and technical information including:

1. Piping and Fittings (all services, types, and joining methods)

2. Pipe Hangers and Supports

3. Identification

4. Sleeves, Firestopping

5. Pipe Expansion Joints, Guides and Anchors

6. Valves and Accessories (all types)

7. Steam Traps

8. Pressure Gauges, Thermometers, Accessories

9. Electric Motors and Starters

10. Boiler/Burner Units

11. Boiler Feed Systems

12. Blowdown Coolers

13. Factory Tests

14. Vibration Isolation

15. Complete ductwork, equipment layout, and piping shop drawings, construction details and construction standards

16. Louvers

17. Fans

18. Factory Painting

19. Insulation

20. Chimneys, Stacks, and Flues

21. Coordination Drawing

22. Operating and maintenance instructions and manuals

23. HVAC Control Systems

24. Seismic Restraints

25. Testing, Adjusting, & Balancing Qualifications, Plan, and Reports

26. Identification, labels and tags, including database for all equipment and devices

27. O&M manual table of contents

28. O&M manual

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in an individual (combined) submittal.

1. Do not submit multiple product information in a single bound manual.

2. Three-ring binders shall not be accepted.

F. Deviations

1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.

2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.

3. Approval of proposed deviations, if any, will be made at discretion of Engineer.

G. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule: Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required for the following:

1. HVAC temperature control submittals

2. Coordination Drawings

3. TAB Plan

4. TAB draft and final balancing reports.

5. O&M manuals

6. As built drawings

7. If more than five shop drawings of a single trade are received in one calendar week.

H. Responsibility

1. Intent of Submittal review is to check for capacity, rating, and certain construction features. HVAC Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the HVAC Contractor from proceeding in error and will not absolve the Contractor from meeting the full design intent of the associated system(s). Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. Inform Contractors, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.

I. In the event that the HVAC Subcontractor fails to provide Shop Drawings for any of the products specified herein:

1. The HVAC Subcontractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.

2. If the HVAC Subcontractor furnishes and installs material and/or equipment that is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment. He shall also be responsible for the replacement of this material and/or equipment with material and/or equipment that is in complete accordance with these Specifications, at the direction of the Owner’s Representative.

3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.

4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.

J. Mark dimensions and values in units to match those specified.

K. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.10 OPERATION AND MAINTENANCE DATA

A. Commence preparation of the Operating and Maintenance (O&M) Manuals immediately upon receipt of "Approved" or "Approved as Noted" shop drawings and submit each section within one month. The final submission shall be no later than two months prior to the projected date of Substantial Completion of the Project.

B. Submit O&M table of contents in the submittal phase. O&M manuals shall be built as submittals are accepted and shall include the individual equipment manufacturer's data retrieval sheet, as per Attachment A in Part IV for input into the Owner's Maintenance Management System. Form shall be provided and completed electronically.

C. Each O&M document shall include the manufacturer's web address for equipment - specific O&M information for Internet access by the Owner.

D. The manual shall consist of (3) sets of manuals and include (3) sets of CDs, which shall contain the scanned content of the entire manual. The manual shall highlight the actual equipment used and not be a master catalog of all similar products of the manufacturer. The manual shall be submitted for review prior to creation of the CDs.

E. The Manual shall contain the following:

1. Operations Manual

   a. Systems description including all relevant information needed for day-to-day operations and management including:

      1) Start-up procedures

      2) Shut-down procedures.

      3) Trouble-shooting checklist (i.e., common alarms with possible cause & effect, etc.)

   b. Wiring diagrams, schematics and sequence of operations that accurately depict the controls system.

   c. Depiction of each interface screen where programmable logic and visual displays are provided. Descriptors shall be provided to define displayed data, alarms, etc.

   d. A single sheet (for ease of removal) of all access codes and passwords necessary to access all levels of control and programming.

2. Maintenance Manual

   a. Define all maintenance activities required to ensure system operation within manufacturers specified parameters. Maintenance documentation shall include:

      1) Data retrieval sheet

2) Special instructions (i.e., lockout/tag-out, etc.)

3) Special tools (i.e., key, allen wrench, etc.)

4) Tasks

5) Frequency

6) Required materials, lubricants, etc.

b. Provide table of all required activities plotted vs. interval with adequate fill-in-space for “activity completion date” and “comments”. Where multiple instrument readings are required, provide data sheet formatted to accommodate activity.

c. Provide as part of each package, lubricating charts indicating equipment tag number, location, equipment service, greasing and lubricating requirements, lubricants, and intervals.

d. Provide as part of each package, a valve and system chart that corresponds to the valve tags. Provide directions for normal positions and positions for equipment failure modes.

e. Provide all information as listed on the Facility Support Services data sheet as per Attachment A in Part IV for input into the Owner’s Maintenance Management System. Form shall be provided and completed electronically.

f. The HVAC Subcontractor shall furnish spare-parts data for each different item of equipment furnished. The data shall include a complete list of: parts and supplies, with current unit prices, lead time, and source of supply; a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified hereinafter to be furnished as part of the contract; and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 360 days at the particular installation. The foregoing shall not relieve the HVAC Subcontractor of any responsibilities under the guarantees specified herein.

g. Provide copy of all warranty information with associated date of substantial completion (commencement of warranty) and end date of coverage. Define all components/subsystems specifically included and excluded.

F. Provide O&M manuals for each of the following as a minimum:

1. Pipe Expansion Joints

2. Valves and Accessories (all types, including charts for all balancing valves)

3. Steam Traps

4. Electric Motors and Starters

5. Boiler/Burner Units

6. Boiler Feed Systems

7. Blowdown Coolers

8. Vibration Isolation

9. Fans

10. HVAC Control Systems

1.11 RECORD DRAWINGS

A. Refer to DIVISION 1, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.

B. Record Drawings (red-line drawings) will be updated by this Contractor daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as completed, including dimensions (vertical/horizontal) of concealed components off fixed building elements.

C. The HVAC Foreman shall maintain complete and separate set of prints of Contract Drawings at job site at all times and shall record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.

D. At completion of work the HVAC Contractor shall prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The Architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. The HVAC Contractor shall transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CADD layering as established by the A & E design team shall be maintained with any and all changes done by the Contractor.

E. The Engineer is not granting to the Contractor any Ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Engineer is granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Engineer harmless from all loses, claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.

F. Record Drawings, shall show "as-built" condition of all plans, mechanical room part plans, details, sections, piping diagrams, control diagram and sequence changes and corrections to schedules. Schedules shall show actual manufacturer model numbers and capacities of final installed equipment.

G. The HVAC Contractor shall submit the record set for approval a minimum of three weeks prior to seeking the permanent certificate of occupancy.

1.12 WARRANTIES

A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all

liabilities which the manufacturer and the HVAC Subcontractor may have by law or by provisions of the Contract Documents.

B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one year commencing with the Date of Substantial Completion. Where individual equipment sections specify longer warrantees, provide the longer warrantee. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.

C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.

D. Upon receipt of notice from the Owner of the failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.13 COORDINATION

A. Refer to DIVISION 1, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.

B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.

C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner’s Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner’s Representative's satisfaction at no expense to the Owner.

D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, piping, ductwork, etc., and give information in advance to build openings into the work. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the Owner’s Representative for the proper setting of same.

F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not.

G. Make reasonable modifications in the work as required by structural interferences, interference with work of other trades, or for proper execution of the work without extra charge.

H. Keep fully informed as to the size, shape and location of all openings required for the work of this Section and give full information to all Subcontractors and the Owner’s Representative.

1.14 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by the HVAC Subcontractor or his/her Sub Subcontractors, without additional expense to the Owner.

B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the site and shall have the approval of the Engineer before being installed. The HVAC Subcontractor shall follow Drawings, including shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Architect before proceeding with the installation. The HVAC Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of Contractors proposed solution.

D. Sizes of ducts and pipes and routing are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge.

1.15 INSPECTION OF SITE CONDITIONS

A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed. Send a report, in writing, to the Owner's Representative, noting any conditions which might adversely affect the Work of this Section of the Specifications.

1.16 SURVEY AND MEASUREMENTS

A. Base all required measurements, horizontal and vertical, from referenced points established with the Owner's Representative and be responsible for correctly laying out the Work required under this Section of the Specification.

B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.17 DELIVERY, STORAGE AND HANDLING

A. No materials shall be delivered or stored on site until Shop Drawings have been approved.

B. All manufactured materials shall delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.

C. Protect materials against dampness. Store off floors, under cover, and adequately protected from damage.

D. Inspect all equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.18 PROTECTION OF WORK AND PROPERTY

A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.

B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.

C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.

D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.19 SUPERVISION

A. Provide a competent Supervisor with a minimum of 5 years of experience in HVAC Construction Supervision who shall be in charge of the HVAC work at the site.

1.20 SAFETY PRECAUTIONS

A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.

B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and property.

1.21 SCHEDULE

A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.22 HOISTING, SCAFFOLDING AND PLANKING

A. The work to be done under this Section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, scaffolds, staging and planking as required for the work.

1.23 CUTTING AND PATCHING

A. Provide all cutting and patching necessary for the proper installation of work to be performed under this Section.

B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.

C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and

shape and consult with the Owner's Representative and all trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.

D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.

E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment that is part of this Section of the Specifications.

F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.

G. Any cost caused by defective or ill-timed work required by this Section of the specifications shall be borne by the Subcontractor.

H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.24 SLEEVES, INSERTS AND ANCHOR BOLTS

A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this section of the specifications.

B. All pipes passing through floors, walls, ceilings or partitions shall be provided with fire stopping to maintain the fire rating of the structure. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details. Provide sleeves for all penetrations where required by the listed detail, for the penetration of all mechanical room floors and where specifically required on the drawings.

C. Field drilling (core drilling), when required, shall be performed under this section of the specifications, after receipt of approval by the Owner's Representative.

1. When coring cannot be avoided, provide ¼ inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below and protect and piping, ductwork, wiring, furniture, personnel, etc., below the location of the core.

1.25 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

A. Provide all supplementary steel, factory fabricated channels and supports required for proper installation, mounting and support of all equipment and systems provided under this section of the specification.

B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative, as shown on the drawings, or hereinafter specified.

C. The type and size of the supporting channels and supplementary steel provided under this section of the specifications shall be determined by the Subcontractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.

D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

E. All supplementary steel including factory fabricated channels, supports and fittings shall be galvanized steel, aluminum, or stainless steel where exposed or subject to rust producing atmosphere and shall be manufactured by Unistrut, H-strut, Powerstrut, ERICO or approved equal.

1.26 HAZARDOUS MATERIALS

A. Dispose of all hazardous materials in accordance with Federal and State laws. All handling shall conform to EPA requirements. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment. Provide breakout cost for this scope.

B. Removed equipment or fluids containing any hazardous materials such as ethylene glycol, oil, mercury or chromate shall be recycled by a licensed facility approved by the Owner's Representative.

C. Contractor shall carry a stipulated sum of $20,000.00 for the removal of asbestos containing materials, refer to the Asbestos Abatement specification section for requirements. Where insulation is removed, provide new insulation (types and thicknesses as specified in this section). Where scope is not defined, provide unit prices with bid for all pipe and duct sizes involved.

1.27 ACCESSIBILITY

A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are readily accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.28 SEISMIC RESTRAINT REQUIREMENTS

A. Submit working plans and calculations reviewed, signed and stamped by a professional engineer who is registered in the State where the project is located and has specific experience in seismic calculations, certifying that the plans meet all seismic requirements established by authorities having jurisdiction over the project, including bracing for any hazardous exhaust systems.

1.29 WELDING QUALIFICATIONS

A. Piping shall be welded in accordance with qualified procedures using performance qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPV IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer may be accepted as permitted by ASME B31.9. The Owner's Representative shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practicable. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record. Structural members shall be welded in accordance with Division 1.

B. A fire watchman with an approved fire extinguisher shall be posted at the site of the welding work, during that work, and for a minimum of 30 minutes after the work is completed, to see that sparks or drops of hot metal do not start fires.

1.30 ELECTRICAL WORK

A. All electrical apparatus and controls furnished, and the installation thereof, as a part of the HVAC work, equipment, and controls shall conform to applicable requirements under DIVISION 16 - ELECTRICAL.

1.31 PROJECT CLOSEOUT

A. Certificates Of Approval

1. Upon completion of all work, provide certificates of inspections from the following equipment manufacturers stating that the authorized factory representatives have inspected and tested the operation of their respective equipment and found the equipment to be in satisfactory operating condition and installed per the manufacturers installation instructions and requirements.

a. Boilers and Boiler Feed Systems

B. Construction Observations By The Engineer

1. The engineer is contracted to make progress **two** site visits during construction, **one** substantial completion (punch list) site visit for determining substantial completion and **one** Final site visit to determine if all work is complete.

2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.

3. Progress Site Visits

a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.

b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.

C. Substantial Completion

1. When the Contractor considers the Work under this Section is substantially complete, the Contractor shall submit written notice, through the General Contractor, with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Owner and he will not make a substantial completion site visit.

2. The following items shall be completed prior to the written request for substantial completion site visit:

a. Certification of successful operation of all systems.

b. Training of the Owner's personnel in the operation of the systems.

c. Record Drawings in accordance with the contract specifications.

d. Operation and Maintenance manuals.

e. Testing reports.

f. Balancing reports.

g. Manufacturers certificates of approvals.

h. Emergency contact list for reporting of malfunctioning equipment during the warrantee period.

i. Contractors Project Completion certificate in accordance with the building code requirements.

3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.

4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list of the major deficiencies and a reason for the work not being considered substantially complete.

5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.

6. The Contractor shall remedy all deficiencies listed in the punch list within the time frame required by the contract.

D. Engineers Construction Completion Certification

1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete. The following is a minimum listing of the required systems to be tested with reports generated indicating they are complete and ready for use:

a. Air and Water Balancing

b. Boiler Plant Start Up

c. Pipe Pressure Tests

2. There shall be NO outstanding items identified on the punch list for scope within any of these categories.

E. Final Completion

1. The following items shall be submitted prior to the written request for Final completion:

a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.

b. Warranties commencing the date of Substantial completion

c. Individual Signed and dated Punch List acknowledging completion of all punch list items

2. When the Contractor considers all of the punch list work items complete, the Contractor shall submit written notice through the General Contractor that all Punch List items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Architect or Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.

3. If the work is not fully complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any reobservations by the engineer.

F. Re-observation Fees

1. The re-observation fee shall be $1200.00 per visit.

G. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK Engineers can furnish a blank Contractor's certificate form upon request. The certificate shall certify:

a. Execution of all work has been installed in accordance with the approved construction documents.

b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.

2. The certificate shall include the following information:

a. Project.

b. Permit Number.

c. Location.

d. Construction Documents.

e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.

f. Addendum(a) and Revision Dates.

3. The certificate shall be signed by the Contractor and include the following:

a. Signature.

b. Date.

c. Company.

d. License Number.

e. License Expiration Date.

PART 2 - PRODUCTS

2.00 PIPING AND FITTINGS

A. General Requirements for Pipe

1. Pipe material shall be indicated in the Schedule of Pipe and Fittings for each type of service.

2. Steel pipe shall conform to ASTM A53 Grade B or ASTM A106 Grade B (for systems with temperatures that could go over 750 degrees F) black steel. Pipe thickness (schedule) shall be as specified for the service.

B. General Requirements for Fittings

1. Pipe fittings shall be indicated in the Schedule of Pipe and Fittings for each type of service. Fittings shall be rated to match the larger of the pipe pressure rating in the Schedule or the valve rating listed in the valve tables in the Part 2 Valve and Strainer section of this specification.

2. All fittings shall be installed per code requirements and the manufacturer's best recommendations.

3. Malleable iron pipe fittings shall conform to ASME B16.3, type required to match adjacent piping.

4. Cast iron (CI) pipe fittings shall conform to ASME B16.1 or ASME B16.4 type required to match adjacent piping.

5. Steel pipe fittings shall have the manufacturer's trademark affixed in accordance with MSS SP-25 so as to permanently identify the manufacturer. For 90° elbows, provide long radius fitting unless they will not physically fit, in which case short radius may be used. Flanges shall be flat faced weld neck up to Class 125 and raised face weld neck type for Class 150 and above.

6. The steel pipe joining methods below are only allowed when they are specifically listed in the Schedule of Pipe and Fittings:

a. Type S1: Welded fittings shall conform to ASTM A234 with WPA marking. Butt-welded fittings shall conform to ASME B16.9, and socket welded fittings shall conform to ASME B16.11. Make fusion welded joints as required by ANSI/ASME B31.1.

b. Type S2: Steel flanged fittings including flanges, bolts, nuts, bolt patterns, etc. shall be in accordance with ASME B16.5 for the class required (Class 150 minimum). Flange material shall conform to ASTM A53 Grade B. Blind flange material shall conform to ASTM A516 for cold service and ASTM A515 for hot service. Bolts shall be high strength or

intermediate (Class 150 only) strength with material conforming to ASTM A193.

c. Type S3: Cast Iron (CI) flanged fittings shall be of malleable cast iron conforming to ASTM A47, Grade 32510. Bolts shall be high strength or intermediate (Class 125 only) strength with material conforming to ASTM A193. Class 125 iron flanges shall be limited to 175 psig / 230°F (up to 12") and 125 psig / 230°F (14" – 24"). Class 250 iron flanges shall be limited to 400 psig / 250°F (up to 12") and 250 psig / 250°F (14" – 24").

d. Type S4: Ductile iron (DI) flanged fittings shall conform to ASTM A536, Grade 65-45-12. Bolts shall be high strength or intermediate (Class 150 only) strength with material conforming to ASTM A193. Class 150 ductile iron flanges shall be limited to 225 psig / 230°F. Class 300 ductile iron flanges shall be limited to 425 psig / 450°F.

e. Type S5: Threaded joints: For use up to 2" pipe size. Pipe threads shall conform to ASME B1.20.1. Nipples shall conform to ASTM A733 or ASTM B687. Class 125 iron threaded fittings shall be limited to 150 psig / 250°F or 125 psi at 350°F. Class 250 iron threaded fittings shall be limited to 340 psig / 250°F. Class 150 ductile iron threaded fittings shall be limited to 185 psig / 250°F or 150 psig / 300°F (maximum temperature). Class 300 ductile iron threaded fittings shall be limited to 1200 psig / 250°F or 600 psig / 450°F (maximum temperature).

7. Fittings for copper tubing shall be wrought copper and bronze fittings conforming to ASME B16.22 and ASTM B75 or cast copper alloy fittings conforming to ASME B16.18. Copper may be used up to 2" tubing size. Adapters may be used for connecting tubing to flanges and threaded ends of valves and equipment. The copper tubing/pipe joining methods below are only allowed when they are specifically listed in the Schedule of Pipe and Fittings:

   a. Type C1: Soldered copper fittings shall use either 95/5 or silver solder (for systems up to 250 degrees F and 175 psi), or shall be brazed (for higher temperature/pressure systems – Contractor shall submit brazing material and pressure/temperature rating of joint). Solder shall conform to ASTM B32. Solder and flux shall be lead free. Silver solder shall conform to FS QQ-B-654. Brazing alloys shall be B-Ag alloy (or equivalent strength alloy) having a melting point above 1000 degrees F.

8. Composition gaskets for flanges shall conform to ASME B16.21. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16 inch thickness, full face or self-centering flat ring type. Gaskets shall contain aramid fibers bonded with styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR). NBR binder shall be used for hydrocarbon service. Gaskets shall be suitable for pressure and temperatures of piping system.

9. Unions shall conform to FS WW-U-531 or FS WW-U-516, type to match adjacent piping.

10. Adapters for copper tubing shall be brass or bronze for soldered and brazed fittings.

11. Dielectric Waterway fittings equal to PPP Clearflow shall be used where dissimilar pipe materials (such as steel and copper) in any water or glycol system are joined. Fittings shall conform to the tensile strength and dimensional requirements specified in FS WW-U-531. Waterways shall have metal

connections on both ends to match adjacent piping. Metal parts of dielectric Waterways shall be fully separated by NSF/FDA listed thermoplastic lining so that the electrical current is well below 1 percent of the galvanic current that would exist upon metal-to-metal contact. Fittings shall be rated for 300 psig and 225°F. Galvanized pipe, dielectric unions, or insulated couplings shall not be used.

12. Flexible pipe connectors shall be as specified in Vibration Isolation paragraph.

C. Schedules of Pipe and Fittings

1. As used in the pipe and fitting schedule tables, closed loop systems have expansion tanks and are not open to the atmosphere, examples are chilled, hot, dual temperature and closed heat pump condenser water systems. Open loop systems are open to the atmosphere with open condenser water system being the most common.

2. Relief valve piping shall have the same pressure/temperature ratings as the fluid being relieved. Exposed outdoor piping shall be stainless steel.

STEAM AND CONDENSATE SERVICES UP TO 90 PSIG (350ºF MAXIMUM) (Some joint types or materials may have lower pressure and/or temperature limits and Contractor shall ensure they are only used where those limits will NOT be exceeded.)				
Service	**Pipe Material & Schedule or Type**	**Joint Types Allowed**	**Fitting Material**	**Min. Pressure Class (psig) & / or Schedule**
Steam up to 2”	Steel / Schedule 40 (80 if threaded)	S1 or S5	Steel, CI, DI	125 / Sched. 40 (80 if threaded)
Condensate up to 2”	Steel / Schedule 80 Seamless	S1 or S5	Steel, CI, DI	125 / Schedule 80
Steam 2.5”-24”	Steel / Standard Weight	S1, S2, S3, or S4	Steel, CI, DI	125 / Standard Weight
Condensate 2.5”- 24”	Steel / Extra Strong Seamless	S1, S2, or S4	Steel, DI	125 / Extra Strong
Boiler Feed Water up to 2”	Steel / Schedule 80 Seamless	S5	CI, DI	125 / Schedule 80
Boiler Feed Water 2.5”-12”	Steel / Extra Strong Seamless	S1, S2, S3, or S4	Steel, CI, DI	125 / Extra Strong

2.01 PIPE HANGERS AND SUPPORTS

A. Hangers shall be as manufactured by Carpenter & Patterson, Inc., Grinnell Corporation, B-Line Systems, ERICO, or equal. Hangers shall transmit the load exclusively to the structure of the building. All hangers and supports to conform to MSS standards SP-58 and SP-69 and ANSI B 31.1.

B. Hangers for all piping 4 inches and above shall be adjustable roll type. Hangers for piping below 4 inches shall be clevis type. Hangers for piping in tunnels on strut support frames shall be roller type, similar to Fig. B379 by B-Line Systems. Additionally, the first five (5) pipe hangers on both sides of all pump piping (suction and discharge) to be precompressed spring and double-deflection neoprene style, with 30º hanging rod swing capability, similar and equal in all respects to Mason Industries Model PC 30N, selected by manufacturer for anticipated loading and deflection.

C. Provide all additional structural steel required for proper installation of hangers, anchors, guides and supports; hangers shall be arranged to maintain the required grading and pitch of piping, to prevent vibration and to provide for expansion and contraction.

D. Maximum spacing of hangers and supports for steel pipe:

Pipe Size (inches)	Horizontal	Vertical
Up to 1	6 feet	10 feet
1¼-2½	9 feet	15 feet
3-and up	12 feet	15 feet

E. Reduce Steel pipe spacing to a maximum of 10', regardless of pipe, as necessary for fittings, valves, and other concentrated loads.

F. Horizontal copper tubing shall have maximum hanger spacing of 5' for tubing up to 1-¼" and 8' for 1½" and larger. Vertical copper tubing shall have maximum hanger and support spacing of 10 feet. Maximum spacing for PVC pipe hangers and supports shall be 4' (horizontal), and 10' (vertical) with mid-story guides.

G. Steel or stainless steel tubing shall have maximum hanger and support spacing of 8 feet (horizontal) or 10 feet (vertical).

H. If any other piping material is used, the maximum hanger and support spacing shall be the lesser of manufacturers recommendation or the listed spacing in the mechanical code (currently IMC-2009 Table 305.4).

I. Branch piping and runouts of over 5 feet shall have at least one hanger or support.

J. At all copper piping, provide pipe supports with copper finish to eliminate the possibility of galvanic action.

K. Furnish additional hangers or supports at vertical or horizontal changes of direction and at locations of concentrated loads due to valves, fittings, strainers, and accessories.

L. Hangers and supports shall provide for 2" of vertical adjustments.

M. Hanger rods shall be steel, threaded and furnished with two removable nuts at each end of positioning rod and hanger and locking each in place.

N. Except as otherwise noted, hanger rods shall be of the following sizes:

SCHEDULE OF PIPE HANGER ROD SIZES		
Pipe sizes (inches)	**Single rod diameter (inches)**	**Double rod diameter (inches)**
½-2	3/8	3/8
2½-3	½	3/8
4 & 5	5/8	½
6	¾	5/8
8 – 12	N/A	7/8

O. Pipe covering protection saddles shall not be loaded to more than 80% of maximum loading as rated by the manufacturer.

P. Insulated piping insulation shields:

1. Up to 3" pipe size: 18 gauge galvanized steel, located outside the vapor barrier, minimum 180° arc, 12" long, or pipe covering protection saddles.

2. 4" pipe size and larger: pipe covering protection saddles.

Q. Vertical support shall be by means of riser clamps (anchors with split ring type allowable up to 2" size only) and adjustable pipe support with flange anchored to floor or supplementary steel.

R. Rods, clamps and hangers shall be electro-galvanized coated.

S. Valve and piping supports, from the floor, shall be equal to Carpenter & Paterson, Inc. Figure 101, adjustable pipe support and complete with pipe standard and flange, anchored to floor.

1. Supports shall be installed at each control valve, riser, tee or elbow and where any unsupported section exceeds 4'-0" in length measured along piping centerline.

T. Upper Attachments to Building Structure:

1. Existing Reinforced Concrete Construction: Upper attachment welded or clamped to steel clip angles that are expansion-bolted to the concrete. Expansion bolting shall be located so that piping loads place bolts in shear. Submit details for approval.

2. Structural Steel Framing: Upper attachments welded or clamped to structural steel members. Additional steel members may be necessary in some support locations where piping locations differ from that known on contract drawings. Submit details for approval.

3. Expansion Fasteners and Power Set Fasteners: In existing concrete slab construction, expansion fasteners may be used for hanger loads up to one-third the manufacturer's rated strength of the expansion fastener. Power set fasteners may be used for loads up to one-fourth of rated load. When greater hanger loads are encountered, additional fasteners may be used and interconnected with steel members combining to support the hanger.

2.02 SLEEVES

A. Size sleeves to provide a minimum of 1 inch clearance around piping and ductwork, and to allow continuous runs of insulation where specified. Ensure that insulated piping and ductwork do not touch sleeves.

B. Pack clearance spaces with Thermafibre Firestopping. Caulk with fire-resistant, resilient waterproof compound, RectorSeal Biostop 500+ or equal. Ensure that fire ratings of floors and walls are maintained.

C. Piping sleeves shall be according to the following:

1. Through interior non-masonry walls, use 18 gauge rolled and tack welded galvanized steel sleeves, set flush with finished surfaces on both sides.

2. Through interior masonry walls, exterior walls above grade and roofs, use machine cut and reamed standard weight steel piping, set flush with finished surfaces on inside and to suit flashing on outside.

2.03 VALVES AND STRAINERS

A. General:

1. Valves and strainers shall be constructed of the materials shown in the tables for each system and be rated by the manufacturer for the appropriate pressure class required for the listed pressure and temperature limits and for the fluid used and per the valve tables.

2. The manufacturers and model numbers indicated below are to be used as a means of identifying the type, quality, materials and workmanship required. Note that some of the manufacturers listed for a type of valve do not make valves for all pressure/temperature limits and/or all sizes. All valves of each type (400 psig ball, 150 psig globe, etc.) for the project shall be by the same manufacturer.

3. All valves shall be located and oriented as to valve stem direction to permit proper and easy operation, and access to valve for maintenance of packing, seat and disc. Valve stems shall not be tilted down unless approved by the manufacturer. Where valves are more than seven feet above the floor, stems shall be horizontal and all valves 2-1/2" and above shall have chain wheel and "endless link" style chain for operation from floor; where impact wheel is required, it shall be provided. Packing and gaskets shall not contain asbestos. Provide unions adjacent to equipment end of all threaded and soldered or permanent push-to-connect end valves. Provide grooved joint couplings adjacent to equipment end of all grooved end valves.

B. Service:

1. Shutoff or Isolation Valves shall be provided in all branch connections to mains and where shown on piping diagrams.

a. In general, for 2½" and larger piping use flanged valves or grooved-ended valves in grooved water systems; butterfly valves for water and glycol systems or gate valves for steam and condensate systems.

b. In general, for piping smaller than 2½" use threaded, sweat, permanent push-to-connect or press/crimped water system connections; ball valves for water systems or gate valves for steam and condensate systems.

2. Check Valves

a. For pump discharge use silent check valves (where allowed in the tables and where triple duty valves are not used). All others shall be swing-check type.

3. Drain Valves and Manual Vent Valves

a. Globe with plug-type disc or ball valves (as shown on drawings).

C. Swing Check Valves: Bronze valves shall conform to MSS SP-80, of the type required for the pressure class and body connection type listed in the tables. Iron valves shall conform to MSS SP-71, of the type required for the pressure class and body connection type listed in the tables. Steel valves shall conform to ASME B16.34, of the type required for the pressure class and body connection type listed in the tables. Valves shall be as manufactured by Stockham, Milwaukee, Crane, Nibco, Victaulic (grooved), Grinnell (grooved), or Hammond.

D. Silent Check Valves: Silent check valves for use on pump discharge shall be of the materials and pressure/temperature ratings shown in the tables. Minimum open area through valve shall be at least 100% of the pipe area. Valves shall be as manufactured by Mueller, Nibco, Metraflex, APCO, Victaulic (grooved), Grinnell (grooved), or SF Equipment.

E. Gate Valves: Bronze valves shall conform to MSS SP-80, of the type required for the pressure class and body connection type listed in the tables. Iron valves shall conform to MSS SP-70, of the type required for the pressure class and body connection type listed in the tables. Steel valves shall conform to ASME B16.34, of the type required for the

pressure class and body connection type listed in the tables. Maximum seat leakage shall be no more than 10 cc/hr per inch of diameter. Valves shall be as manufactured by Stockham, Milwaukee, Crane, Nibco, or Hammond. For areas where clearances are restricted, non-rising stems may be used – Contractor shall indicate locations on submittal.

F. Ball Valves: Valves shall meet FS WW-V-35C, Type II, and have the appropriate trim to meet the required pressure/temperature ratings listed in the tables. Valves shall have locking handles to allow servicing and removal of piping or equipment. Valves on insulated piping shall have stem extension assemblies equal to the insulation thickness. Valves shall have 100% tight shut-off (no seat leakage). Valves shall be as manufactured by Conbraco Industries (Apollo), Watts, Stockham, Nibco, Hammond, or Milwaukee. Ball valves for modulating control service shall have characterized disc to provide equal percentage flow characteristics and extended rangeability. Modulating ball valves shall be Bray VCB series or Belimo B series.

1. Bronze valves shall conform to MSS SP-80, of the type required for the pressure class and body connection type listed in the tables. Iron valves shall conform to MSS SP-71, of the type required for the pressure class and body connection type listed in the tables.

2. All valves on insulated piping shall be supplied with removable preformed insulation equal in R-value to the adjacent pipe insulation and a removable PVC jacket.

3. Provide one portable differential meter suitable for the operating and differential pressures specified and required, complete with hoses, vent, and carrying case.

4. On grooved piping systems, equivalent tri-service valve assemblies may be used in lieu of Triple Duty pump discharge valves as shown on plans and in accordance with the manufacturer's installation instructions. Valve size shall match pipe size and be straight pattern consisting of a combination shut-off, throttling, flow measurement, and non-slam check valve in one unit with a maximum pressure rating of 300 psi and temperatures to 230 deg F, memory stops standard.

G. Strainers

1. Strainer-body connections shall be the same size as the pipe lines in which the connections are installed. The bodies shall have arrows clearly cast on the sides to indicate the direction of flow. Each strainer shall be equipped with an easily removable cover and sediment basket. The body or bottom opening shall be equipped with a tapped blowdown opening. Provide full size nipple and appropriate type of valve for blowdown. The basket shall be of stainless steel with small perforations of sufficient number to provide a net free area through the basket of at least 5 times that of the entering pipe. The flow shall be into the basket and out through the perforations. Bronze strainers shall conform to MSS SP-80, of the type required for the pressure class and body connection type listed in the tables. Iron strainers shall conform to MSS SP-71, of the type required for the pressure class and body connection type listed in the tables. Steel strainers shall conform to ASME B16.34, of the type required for the pressure class and body connection type listed in the tables. Y-type strainers are listed in the tables, provide basket type strainers of same construction where shown on drawings. Strainers shall be as manufactured by Mueller, Sarco, Watts, Armstrong, Keckley, or Yarway.

2. Strainers for grooved end piping systems shall be of the same size as the pipe lines in which the connections are installed. The bodies shall have arrows clearly cast on the sides to indicate the direction of flow. Each strainer shall be equipped with an easily removable cover and sediment basket. The body or bottom opening shall be equipped with a tapped blowdown opening:

    a. Y-pattern, 2" through 12" sizes, 300 psi maximum pressure rating. Suitable for services up to 210°F, ductile iron body, Type 304 stainless steel perforated metal removable baskets, blowdown port with pipe plug and grooved ends.

    b. T-pattern, 2" through 12" sizes, 300 psi maximum pressure rating. Suitable for services up to 210°F, ductile iron body, Type 304 stainless steel frame and mesh removable basket, removable access coupling/cap for strainer maintenance, and grooved ends.

    c. T-pattern, 14" through 24" sizes, 300 psi maximum pressure rating. Suitable for services up to 210°F, carbon steel body, Type 304 stainless steel frame and mesh removable basket, carbon steel T-bolt hinged closure/cap for strainer maintenance, and grooved ends.

H. Water Pressure Reducing and Back-pressure Valves

1. Valves shall be as manufactured by Bell and Gossett, Armstrong, Taco, Spence, Sarco, Leslie, Kay & MacDonald, Cashco, or Watts.

2. Provide pressure reducing and back-pressure regulating valves where shown on the drawings. Valves shall be constructed for the applicable temperature and pressure limits in the table for the service intended.

3. Make-up water PRVs shall be provided with integral low inlet-pressure check valves and inlet strainers. The strainers shall be easily removable without system shutdown. The valve seat, strainer and stem shall be removable and of non-corrosive material. The body shall be brass. The valve shall be full line sized as shown on the Drawings. Pressure setting to be minimum system operating pressure (static head plus approximately 5 psi).

I. Pressure Relief Valves and Accessories

1. Pressure relief valves shall be provided where shown on the drawings in accordance with ASME BPV VIII Div 1. Relief valves shall be constructed for the maximum pressure the system can operate at. The aggregate relieving capacity of the relief valves shall be not less than that required by the above code. Provide at least one relief valve for each closed loop piping system. Discharge from water relief valves shall be to indirect drain. Pipe steam relief valves to a safe location outdoors. Valves shall be as manufactured by Watts, Kunkle, Lonergan, or Lunkenheimer.

2. For steam relief valves that are piped outdoors, provide steam exhaust heads where shown on drawings. Exhaust heads shall be low pressure drop cyclone design with drains as manufactured by Bryan Steam HEH Series (rated at 7,000 fpn) or equal by, Crane (Cochrane), Penn Separator, Watson McDaniel, Anderson or Hayward (Wright-Austin). Pipe drains as required. Exhaust heads shall remove at least 99% of liquids and solids larger than 10 microns and be fabricated of cast iron or carbon steel (with high heat and rust resistant aluminum paint) with stainless steel separating elements. Contractor shall verify that the exhaust head's steam capacity is equal to or greater than the associated relief valves capacity and provide any required pipe increases

J. Air Vents: Provide air vents at all high points in the piping systems meeting the pressure and temperature limits shown on the table for each system.

1. Automatic: Normal Capacity – Float operated with bronze or steel body and stainless steel internals, ball-check valve type with materials as required for the pressure/temperature listed in the table for the system. Provide each vent with safe drainage piping for venting air/water to drain.

2. Manual: For low pressure/temperature water and glycol systems, provide 1/8-in. brass body, chrome plated with two-detachable keys. For higher pressure/ temperature systems, provide globe valves with plug-type disc or ball valves with materials, as required and allowed in the table for the system.

K. Drain Valves: Drain valves shall be one of the type listed for isolation in the table for each piping system. Provide drain connections at all equipment and all low points in the piping systems to allow for complete drainage. Drain connections shall have full size threaded hose end connections with cap/plug. For piping up to 4", provide minimum ¾" valves. For piping between 4" and 10", provide minimum 1½" valves. For piping larger than 10", provide minimum 2" valves. Provide 50' of premium grade hose for each size drain.

L. Valve Lubrication: Furnish a lubrication gun in the mechanical equipment room with extra lubricant sticks sufficient to repack each valve. Guns shall be extra heavy, lever type hydraulic hand type with automatic shutoff, 1500 psi gauge and 12" long connecting hose. Lubricant shall be as required by valve manufacturer for the service intended.

WATER AND FUEL OIL SERVICES
Maximum 250ºF and 150 psig (up to 12")/ 125 psig (over 12")

Valve Type	Size	Type	Application	Body/Trim Body/Seat	Type of Connection	Minimum Pressure Rating/Class
Ball	½" – 2"	2 or 3 piece	Isolation or ATC Modulation (with characterized disc)	Brass or Bronze/RTFE	Sweat or Threaded	400 psig WOG (Water, Oil or Gas) or ANSI Class 250
Butterfly	2½" - 12"	General Service	Isolation or ATC 2-Position	Iron/EPDM	Flanged (ANSI 125/ 150)	175 psig CWP (Cold Water Pressure), Bi-directional, 150 psig dead end service.
Butterfly	2½ " - 24"	High Performance	ATC Modulation (C_v at 2/3 open)	Steel/Filled PTFE	Flanged (ANSI 125/ 150)	ANSI Class 150
Globe	½" – 2"	Control	ATC Modulation	Bronze/Brass	Threaded	ANSI Class 125
Balancing/ Shutoff	½" – 2"	Flow Indication	Isolation and balancing	Brass or Bronze/Brass	Sweat or Threaded	ANSI Class 125
Balancing/ Shutoff	2½" - 12"	Flow Indication	Isolation and balancing	Iron/Brass	Flanged	ANSI Class 125
Triple Duty	To 2"	Flow Indication	Pump discharge isolation, check, and balancing	Bronze or Iron/Brass	Threaded	ANSI Class 125
Triple Duty	2½" - 14"	Flow Indication	Pump discharge isolation, check, and balancing	Steel or Iron/Brass	Flanged	ANSI Class 125
Check	To 1½"	Silent Wafer	Pump discharge	Iron/Bronze or Brass	Flanged	ANSI Class 125
Check	2" -	Silent Globe	Pump discharge	Iron/Bronze or	Flanged	ANSI Class 125

	24”			Brass		
Check	½” - 2”	Swing	Piping	Bronze/Bronze	Sweat or Threaded	ANSI Class 125
Check	2½” - 24”	Swing	Piping	Iron/Bronze or Iron	Flanged	ANSI Class 125
Strainer	½” - 2”	Y-type	ACVs, P&F HXs	Bronze or Iron/Stainless 1/16” screen	Sweat or Threaded	ANSI Class 125
Strainer	2½” – 4”	Y-type	ACVs, P&F HXs	Iron/Stainless 1/16” screen	Flanged	ANSI Class 125
Strainer	5” – 24”	Y-type	ACVs, P&F HXs	Iron/Stainless 1/8” screen	Flanged	ANSI Class 125
Strainer	2” – 16”	Suction Diffuser	Pump Inlet (non-reducing)	Iron/Stainless 5/32” screen with 20 mesh start-up sleeve	Flanged	175 psig Working Pressure or ANSI Class 125

STEAM AND CONDENSATE SERVICES Maximum 90 psig and 350ºF Steam						
Valve Type	**Size**	**Type**	**Application**	**Body/Trim Body/Seat**	**Type of Connection**	**Minimum Pressure Rating/Class**
Ball	½" – 2"	2 piece	Isolation or ATC open-close (non-modulated)	Steel/Multifill PTFE	Threaded	250 psig steam
Butterfly	2½" - 24"	High Performance	Isolation or ATC, open-close or Modulation (with C_v selected at 2/3 open)	Steel/RPTFE or UHMWPE	Flanged	ANSI Class 150 with zero leakage bi-directional Note: ATC modulation is limited to 50 psig steam systems.
Butterfly	2½" - 24"	High Performance (Triple Offset)	Isolation or ATC Modulation (with C_v at 2/3 open)	Steel/Stainless Steel or laminated	Flanged	ANSI Class 150 with zero leakage bi-directional.
Gate	½" – 2"	Screwed Bonnet - Rising stem	Isolation	Bronze/Bronze	Threaded	ANSI Class 125
Gate	2½" - 24"	OS&Y - Rising stem	Isolation	Iron/Bronze	Flanged	ANSI Class 125
Globe	½" – 2"	Screwed Bonnet, Non-Rising stem	Balancing or ATC Modulation	Bronze/Stainless Steel	Threaded	ANSI Class 125
Globe	2½" - 12"	Bolted Bonnet, Non-Rising stem	Balancing or ATC Modulation	Iron/Stainless Steel	Flanged	ANSI Class 125
Check	½" – 2"	Swing	Piping	Bronze/Brass or Bronze	Threaded	ANSI Class 125
Check	2½" - 24"	Swing	Piping	Iron/Bronze	Flanged	ANSI Class 125
Strainer	½" – 2"	Y-type	Piping	Bronze or Iron/Stainless 3/64" screen	Threaded	ANSI Class 125
Strainer	½" – 2"	Y-type	Piping	Steel/Stainless 3/64" screen	Threaded	ANSI Class 125
Strainer	2½" - 10"	Y-type	Piping	Iron/Stainless 3/64" screen	Flanged	ANSI Class 125
Strainer	12" - 24"	Y-type	Piping	Iron/Stainless 1/16" screen	Flanged	ANSI Class 125

2.04 STEAM TRAPS

A. Balanced pressure thermostatic traps/airvents shall be designed for steam working pressures up to 125 psig. Traps shall have brass bodies and caps with natural brass finish. Bellows, valve head and renewable valve seat shall be stainless steel

B. Float-and-Thermostatic traps shall be designed for a steam working pressure of 30 psig, but shall operate with a supply pressure of between ¼ and 15 psig. The capacity of the

traps shall be sized for 2 times the equipment capacity. Where modulating control valves are used, trap capacity shall be based on a pressure differential of 1/4 psi. Each float-and-thermostatic trap shall be provided with a hard bronze, monel, or stainless steel valve seat and mechanism and brass float, all of which can be removed easily for inspection or replacement without disturbing the piping connections. Inlet to each trap shall have a cast iron strainer, either an integral part of the trap or a separate item of equipment.

C. Thermodynamic traps shall be disc type with integral or separate strainer and be of stainless steel or cast steel construction. Traps shall be designed for easy replacement of operating section without removal from pipe line, and for steam working pressures of between 4 to 450 psig, and shall operate with up to 80% back-pressure. Provide positive means of air venting without air binding, if not available internally, provide external thermostatic air vent. Provide insulated jacket for the pressure chamber to save steam and reduce wear.

D. Traps shall be by TLV, Gestra, Spirax-Sarco, Hoffman, Illinois, Barnes & Jones, or approved equal.

2.05 PIPING, EQUIPMENT, PANEL AND VALVE IDENTIFICATION

A. All piping, equipment, panels and valves furnished and/or installed under this Section of the Specifications including automatic temperature controls shall be identified with pipe markers, valve tags, equipment plates and/or bar codes. Refer to Part 3 – IDENTIFICATION for materials and methods of installation.

2.06 PRESSURE GAUGES, THERMOMETERS AND ACCESSORIES

A. Pressure Gauges

1. Gauges shall be provided for equipment and piping as indicated. A thermometer and pressure gauge shall be provided on the supply and return mains of each water and glycol system, and on the supply mains of each pressure steam system, and on the supply piping of each pressure steam system.

2. Up to 7 feet above finished floor, provide 4½" diameter gauges; over 7 feet above finished floors, provide 6" diameter gauges, oriented for ease of reading.

3. Provide gauges having one percent of scale range accuracy, brass pipe and fittings, phosphor bronze bourdon tubes, beryllium copper bellows, 1/4-in. NPT male connection, stainless steel rack and pinion movement, micro adjustment for calibration, white dial and black figures, plastic lens, and threaded ring case. Provide minimum 2-inch long brass nipples, ball valves (gate for steam), snubbers, and siphons (steam systems only) for each gauge.

4. Gauge ranges to be selected so that normal operating range for a particular gauge will occur at approximately the midpoint of the total range, and so that under minimum and maximum conditions, damage to gauge will not occur. Provide compound gauges at suction side of condenser water pumps and at the steam inlet of each heat exchanger.

5. Gauge Schedule: Provide at locations indicated on drawings. Shop drawing submittal package to include location, size of gauge and range.

6. Manufacturers: Ashcroft Inc., Ametek/U.S. Gauge Division, Marsh Instruments, Weiss, Weksler, Trerice, or approved equal.

7. Gauges on piping in all mechanical rooms shall be so placed as to be easily read from the floor without parallax.

B. Compound Gauges (based on Trerice No. 600C Series, 4-1/2" size)

1. Provide compound pressure gauges where the pressure readings could be below 0 psig. Gauge shall have cast aluminum case, black finish.

2. Ring shall be friction type, stainless steel, clear glass window, with white dial with black figures and gradations.

3. Pointer shall be adjustable, red tipped.

4. Bourdon tube shall be phosphor bronze soldered to socket and tip, socket shall be brass, ¼" NPT.

5. Accuracy shall be ANSI B.40.1, Grade A, 1% of full scale over middle half of range, 2% of full scale over first and last quarter of range.

C. Thermometers and Wells

1. Separable well type, industrial thermometers of the type specified below. Provide stainless steel separable wells with extended neck to suit insulation thickness. Provide stems and wells to extend approximately to center of the pipe or maximum length of 12-inch for large pipe.

2. Provide thermometers having brass, cast aluminum-bronze or cast aluminum case with blue reading non-mercury and glass windows. Provide minimum 9-inch scales with black numbers and adjustable angle stem. Provide 1 percent accuracy at mid-range. Thermometers shall be as manufactured by Taylor Instrument Co., Ametek/U.S. Gauge Division, Ashcroft Inc., Marsh Instrument, Weiss, Weksler, Trerice, or approved equal.

Service	Scale Range	Divisions
Heating Hot Water and Dual Temperature	[30] to [240] °F.	2ºF

D. P/T Test Plugs

1. Pressure/Temperature Test Plugs shall be nickel-plated brass body, with ½-inch NPS fitting and 2 self-sealing valve-type core inserts, suitable for inserting a 1/8-inch O.D. probe assembly from a dial-type thermometer or pressure gauge. Test plug shall have gasketed and threaded cap with retention chain and body of length to extend beyond insulation. Pressure rating shall be 500 psig.

2. Core Material: Conform to the following for fluid and temperature range:

   a. Water, minus 30 deg to 275 deg F (minus 35 to 136 deg C): EPDM.

3. Test Kit: Provide test kit consisting of 2 pressure gauges, gauge adapters with probes, 2 bimetal dial thermometers, and carrying case.

4. Ranges of pressure gauges and thermometers shall be approximately 2 times systems operating conditions.

5. Manufacturers: Peterson Equipment (Pete's Plug), Sisco (A Spedco Co.), Trerice, Watts Regulator, or approved equal.

2.07 MOTORS, DRIVES AND STARTERS

A. All equipment shall be provided complete with motors and drives, unless otherwise indicated.

B. Motors shall be Premium Efficiency (as available by size/speed/horsepower) and shall conform to NEMA Standards and shall be suitable for load, duty service and location. Motors shall have nameplates giving manufacturer's name, serial number, horsepower, efficiency, speed and current characteristics. Motors shall be Century “E+3”, General Electric “Energy Saver Premium”, Reliance “Premium Energy Efficient” Series, Baldor “Super Premium Efficiency”, or approved equal.

C. Motors shall be tested in accordance with the standards of ANSI C50 and conform therewith for insulation resistance and electric strength. Minimum efficiency levels shall be as listed in latest edition of ANSI/ASHRAE Standard 90.1 or the state’s energy code, whichever is higher. All motors shall be tested in accordance with IEEE Standard 112, Test Method B. Provide on nameplate the type of bearing grease to use.

D. Motors for use with variable frequency drives (VFD) shall be inverter duty rated and labeled, meet NEMA MG-1 Part 31, and have a minimum Class F or H insulation. All VFD motors shall have AEGIS™ or approved equal Shaft Ground Rings to prevent electrical bearing damage from capacitively coupled shaft voltages. For motors up to 100 HP, ring shall be installed on either the drive end or non-drive end. Motors over 100 HP shall have ring installed on the drive end of the motor with an insulated bearing on the non-drive end to prevent circulating currents. If rings are not factory installed, Contractor shall install them in the field following manufacturer’s requirements and, to start factory warranty, shall register them with AEGIS™ in the Owner’s name. Failure to install or register the rings will require Contractor to take on the responsibility of providing a 15 year warranty and to replace any failed motor bearings during the 15 year period.

E. Motors ½ HP and larger shall be squirrel cage induction, ball or roller bearings with pressure grease lubrication, specifically wound for the scheduled voltages.

F. Motors less than ½ HP shall be capacitor start of split phase type, specifically wound for 120V/1PH/60HZ alternating current, unless otherwise noted. Fractional horsepower motors, integral to equipment intended for installation in finished public spaces, shall be provided with an overload device responsive to motor current. The device shall be integral to the motor or separate as part of the controls.

G. Motors shall be furnished complete with conduit terminal box of size adequate to accommodate conduits and wires as sized on the Electrical Drawings or specified under this Section.

H. Motor capacity shall be sufficient to operate associated driven devices under conditions of operation and load and with overload and at least the horsepower indicated or specified. All motors shall be of the premium efficiency, high power factor, low energy consuming type most suitable for the application and installed environment. Any motor replacement necessary for compliance to the application shall be at no additional cost to the Owner.

I. Motors shall be suitable for continuous duty at rated horsepower with temperature rise not to exceed 40°C for drip proof motors, 50°C for splash proof motors, 55°C for totally enclosed or explosion proof motors. All non-VFD motors shall be capable of 15% overload without overheating and suitable for operation for the ambient conditions of its specific location.

J. Direct connected motors shall be furnished with adjustable base. Motors connected to driven equipment by belt or shaft shall be furnished with adjustable sliding bases, except fractional HP motors, which shall have slotted mounting holes.

K. Drives for belted motors shall be as manufactured by Dodge Manufacturing Company, Browning Manufacturing Company, T.B. Woods Company or equal with adjustable motor sheaves and adjustable slide bases. The drive belts shall be as short as practicable. All fans and fan units shall be furnished with cogged-type triple V-belt drives, each sized for 150% of the design drive capacity. All multiple belt drives shall have matched sets of belts.

L. Where starters or variable speed drives are not integral with packaged equipment specified in this section, the Electrical Subcontractor shall furnish all starters and drives in accordance with Division 16 drawings and specifications.

M. For packaged equipment, motor controllers shall be equipped with all poles, auxiliary contacts and other devices necessary to permit the interlocking and control sequences required. Controller operating coils shall be generally designed for 120 volt operation, and 3 phase motors shall be provided with thermal overload protection in all phases.

N. All electrical apparatus furnished under this Section shall be approved by UL (or other agencies approved by the authority having jurisdiction) and shall be labeled or listed where such is applicable. Where custom-built equipment is specified and the UL label or listing is not applicable to the completed product, all components used in the construction of such equipment shall be labeled or listed by UL where such is applicable to the component.

2.08 BOILERS (VERTICAL MULTIPORT STEAM BOILERS)

A. Provide vertical muiltiport steam boilers and burners as scheduled with all required operating and safety controls (including those shown on the control drawing as by the manufacturer).

B. Acceptable Manufacturers

1. This specification is based on the Edge Series boilers as manufactured by Fulton Steam Solutions, Inc. Equivalent units and manufacturers must meet all performance criteria for all fuel options, and will be considered upon prior approval.

2. Basis of Design: Fulton Steam Solutions, Inc. Models:

   a. VMP-40 – 1,035 lb/hr (1,035,000 BTU/hr Output)

3. Steam Output rating at 212 of feedwater temperature, 0 psig (Sea Level to 2000 ft)

4. The boiler manufacturer shall have the capability to construct an engineered system, skid mounted, including but not limited to mounting any number of boilers in a common system with common piping headers and single source customer connections for single source steam supply, feedwater, drain, electrical power, fuel supply, condensate return, and vents. Electrical panel boxes for the system must be available along with all wiring requirements. Other available components shall include feed-water tanks and pumps, chemical feed systems, water softeners, carbon filters, and various relevant valves and other accessories. The system manufacturer shall have the engineering capabilities for all aspects of the mechanical and electrical design aspects of the skid mounted system.

5. Customers, engineers and contractors shall have the option to visit the boiler manufacturer’s factory to witness manufacturing, testing, and other operational safety inspections associated with the referenced boilers.

C. Boiler Construction

1. The boiler shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping.

2. The pressure vessel design and construction shall be in accordance with Section I or Section IV of the ASME Code for steam boilers. The boiler shall comply with CSD-1 code requirements and carry a UL listing (CSA/CUL approval for Canada).

3. It shall be acceptable to vent the boiler using sealed combustion (drawing in fresh air from the outdoors) or to draw air from the mechanical room itself.

4. The flue (exhaust) stack and any components associated with the stack must be suitable for 1,000 F.

5. The stack arrangement must supply a negative .02" to negative .04" W.C. pressure with the burner off.

6. The pressure vessel shell, furnace, flue pipes, and heads shall be SA-53B ERW pipe or SA-516 Grade 70 plate and have the following thickness (150 psig design):

Edge Model	Shell (Inches)	Head (Inches)	Furnace (Inches)	Flue Pipes (inches)
30	0.313	0.625	0.5	0.218

7. The pressure vessel flue pipes shall be a minimum of Schedule 80 pipes. Turbulators are installed in the flue pipes to enhance the heat transfer and distribute the flow of the flue gases.

8. The pressure vessel shall be insulated with high temperature blanket insulation, and all necessary refractories shall be installed in the boiler.

9. The boiler shall be supported on a reinforced bottom pan with angle iron support.

10. The jacket shall be a minimum of 18 gauge metal and shall have a primer and finish coat of paint.

D. Boiler Design

1. The boiler shall be a vertical tubeless design. The top mounted forced draft burner will fire from the top of the boiler down through a circular furnace. The burner location and firing method shall be such that combustion takes place within the water-backed furnace of the boiler.

2. The boiler input shall not exceed the fuel usage specified on the Fulton Data Submittal for the specified model size.

3. The capacity of each unit shall be able to produce continuously the steam rate specified by the steam output on the Fulton Product Data Submittal for the specified model size.

4. Adequate hand-holes shall be provided for access to the water side of the boiler. Hand-holes and cleanout openings shall be provided at the lower part of the boiler so that the entire bottom of the boiler may be cleaned.

5. Flue gases shall preheat the combustion air. The combustion air preheater arrangement shall be an internal, integral part of the boiler assembly. External heat exchangers are not permitted.

6. The boiler shall make use of turbulators inserted into the flue pipes to enhance heat transfer and distribute the flow of flue gases.

7. External radiation heat losses from the boiler shall be less than 0.5% of the rated boiler input (assuming an ambient air temperature of 70F, and the boiler is operating at no more than 100psi steam pressure).

8. The boiler shall have an optional configuration for dual fuel with natural gas/propane, with modulated operation on both fuels.

9. The boiler shall have an optional configuration for dual fuel with NG/LP and #2 oil, modulated on both fuels.

10. The water volume of the boiler shall not be less than:

    a. 40 – 170 Gallons

E. Controls

1. The flame safeguard control shall be provided for modulated type control on all fuels and shall provide the following:

    a. The control shall provide a 7 second minimum pre-purge and post-purge time (30 sec. Minimum for 60HP and up).

    b. The control shall maintain a running history of operating hours, number of cycles, and the most recent six control lockouts.

    c. The control is connected to a display module, which is capable of retrieving the information listed above.

2. A flame observation port shall be provided.

3. The boiler shall be set up for a minimum of 3:1 turndown when firing on natural gas.

4. Airflow shall be controlled by a servo-operated butterfly valve. Fuel flow shall be controlled by a servo-operated butterfly valve for gas operation.

5. Burner selection and Burner and Safety Controls:

    a. Burner location and firing method to be such that combustion takes place within the water backed furnace of the boiler. Burner to be top mounted and of the down fired design. Burner controls shall be modulating type as described above and are to include the following:

        1) Operating pressure control for automatic start and stop of burner operation.

        2) High Limit Pressure Controller with manual reset.

3) Two low water cut-off probes to cause shut down of unit when water level drops to minimum safe level (one in the water column and one in the boiler shell). The probe in the shell shall be manual reset to comply with ANSI/ASME CSD-1 Code.

4) Boilers shall have an air safety switch to prevent operation until sufficient combustion is assured.

5) Flame detector to prove combustion.

6) A contact for a feedwater pump shall be included and consist of a single phase motor starter or contacts for a 3 phase pump.

7) An electronic type combustion flame safeguard shall be included to provide full protection against flame failure. The control shall maintain a running history of operating hours, number of cycles, and the most recent six flame failures. This control shall have the capability to be connected to a key board display module which will retrieve that information.

8) Burner motor control shall have thermal overload protection.

9) All controls to be panel mounted in a NEMA __ enclosure and so located on the boiler as to provide ease of servicing the burner and boiler without disturbing the controls. Panel shall be located to prevent possible damage by water, fuel or heat, of combustion gases. Controls connected to water or fuel shall be installed outside the main boiler control panel. All controls shall be mounted and wired according to Underwriters' Laboratories requirements.

F. Main Fuel Train Components

1. A factory mounted main gas train shall be supplied. The gas train shall be fully assembled, wired, and installed on the boiler and shall comply with CSD-1 and/or CSA code. Compliance with other codes is available upon request. The maximum pressure rating of the components shall not be less than 2 psi.

2. Standard CSD-1 fuel trains shall comply with IRI, which has been replaced by GE GAP. Normally open vent valves are no longer required between the safety shut off valves. NFPA 85 compliance shall be available from the factory to comply with local codes or regulations that specifically require a vent valve.

3. Custom fuel trains are available upon request.

G. Boiler Fittings & Trim

1. The boiler shall be supplied with an ASME Section I or Section IV safety relief valve. The safety relief valve size shall be in accordance with ASME code requirements and set at 150 psig for Section I Pressure Vessels, or 15 psig for Section IV Pressure Vessels. Custom set pressures upon request.

2. A water column shall be piped to the boiler at the factory. A gauge glass and drain valve will be supplied. The gauge glass shall be protected by a plexi-glass gauge protector and four brass rods as an additional safety factor. The water column shall also include the primary low water cutoff prove to automatically shutoff burner operation when water falls below a predetermined level. An auxiliary low water cutoff probe shall be mounted in the boiler shell. The water column shall

contain two water level probes, one to “start” and one to “stop” the feed water pump.

3. A steam pressure gauge shall be included with the boiler, mounted on the water column, and shall be complete with test connection.

4. Feedwater stop and check valve shall be supplied at factory in line to an internally baffled feed connection in boiler shell to prevent thermal shock.

5. Additional standard trim shall include Y-type blow down valve and water column blow down valve.

6. A surface blowdown connection shall be provided, and provided with a manual valve.

7. A high water connection shall be provided as standard.

8. The boiler shall come with lifting eyes accessible for rigging. Transporting by fork lift is also acceptable.

9. Instructions for installation, operation and maintenance of the boiler shall be contained in a manual provided with each boiler.

10. A wiring diagram corresponding to the boiler configuration shall be included with each boiler.

11. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

H. Installation

1. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturers’ installation requirements.

2. The installer shall construct a flat, level foundation designed to support the entire load. Calculations shall be based upon the maximum or filled weight of the system. The boiler should be located in dry surroundings on a level base, making sure that there is sufficient room around the boiler to enable the operator and/or the maintenance engineer to gain access to all parts of the boiler. Check location for ease of water supply and electrical connections. Place the boiler on a non combustible floor with clearances to unprotected combustible materials, including plaster or combustible supports.

3. Assemble unit sections and parts shipped loose or unassembled for shipment purposes. Follow manufacturer's installation recommendations and instructions.

4. Install electrical control items furnished by manufacturer per wiring diagram provided by manufacturer.

5. Complete feedwater, steam, blowdown, fuel, safety valve discharge, and vent piping installation as required by manufacturer for operation of system.

6. Provide applicable air intake and exhaust piping, size and type as recommended by the manufacturer to maintain appropriate draft, and rated for the temperatures as listed above.

I. Field Quality Control

1. After boiler installation is completed, the manufacturer shall provide the services of a field representative for starting the unit and training the operator.

2. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

2.09 CONDENSATE TRANSFER UNIT

A. Each pump shall have a capacity not less than that indicated when discharging against the specified pressure. The minimum capacity of the tank shall be as indicated. The condensate pumping unit shall be the duplex type as indicated. The unit shall consist of:

1. Cast iron condensate receiver

2. Two (2) condensate transfer pumps with electric motor drive

3. Two (2) pump actuation flow switches

4. Accessories as specified herein

B. Equipment shall be mounted on a suitable cast-iron or steel base. The motor may be mounted on the top of the receiving tank. The pump, motor, and receiving tank may be mounted on a single base with the receiver piped to the pump suctions.

C. Condensate pumps shall be vertical design, 2-stage pumps with stainless steel axial flow inducers for true 2' NPSH operation. Pumps shall have 250 degree F leak less mechanical shaft seal, bronze fitted, with balanced and enclosed cast bronze impeller mounted on a stainless steel shaft. Bearings shall be factory sealed and permanently lubricated. Pump motors shall be totally enclosed, 1750 RPM. Pumps shall have hydro lock wearing ring and internal cast-iron baffle to prevent pre-rotation of water in pump volute. Furnish with NEMA 4 float switches and starters with wiring in seal-tight conduit.

D. Receiver shall be close-grained cast iron with a 20- year Manufacturer's warranty, and shall be provided with all the necessary reinforced threaded openings, including condensate return, vent, overflow, and pump suction connections. Inlet strainer shall be provided either integral in the tank or separate in the inlet line to the tank. Height of receiver inlet connection shall be no greater than that of existing condensate return piping, including height of housekeeping pad. Receiver capacity to be as scheduled. Receiver shall be equipped with water level gauge, dial thermometer and all necessary tappings and openings. Furnish with a cast-iron basket type inlet strainer with vertical, self-cleaning bronze screen and large dirt pocket, and bronze butterfly type suction isolation valves between each condensate pump and receiver. Pumps shall be furnished with an automatic electric alternator.

E. Vent pipe shall be galvanized steel, and the fittings shall be galvanized malleable iron. Vent pipe shall be extended through the roof and shall be properly flashed.

F. A gate valve and check valve shall be provided in the discharge connection from each pump and a strainer and gate valve shall be provided in the suction line to each pump except where pumps are directly mounted on top of the receiver.

G. Unit to be furnished with a NEMA 4X factory fabricated control panel.

Control cabinets and panels shall be designed and assembled by an approved U.L. manufacturer under N.I.T.W. industrial control panels. Panels shall bear this label. Panels shall be mounted on receiver, with full-length piano hinges and positive latch handles on doors.

Provide starters, pump running indicating lights, switches, relays, fuses, control devices, terminal blocks, etc., as required. Mount all switches, and indicators flush on the front and all components within the cabinet on a perforated sub-plate with coded wiring concealed in plastic troughs and with numbered terminal strips for easy identification of external connections. For identification of panel mounted devices, provide laminated plastic type nameplates of minimum 1" x 3" size with white letters engraved on a black surface. The control cabinet shall be factory-wired, tested and enclosed with components as required, including, but not limited to, the following:

1. Panel Power Disconnect with Cover Interlock
2. 30A Nonfused Disconnect Switch, 3 pole, 240V AC, Heavy Duty
3. Auto/Manual/Off Selector Switch for Each Pump
4. Fused Control Circuit Transformer for Each Circuit
5. Combination Magnetic Starter, having Three Overload Relays, with Circuit Breakers and Cover Mounted Reset Button for Each Pump
6. Necessary Transformers, Relays, Contractors, Power Supplies, Fuses and Devices to Accommodate Intent of Specifications
7. Numbered Terminal Blocks or Strip
8. Engraved Nameplates for all Switches, Indicating Lamps and Components
9. Custom-made Wiring Diagram
10. Alarm contacts for Owner's DDC system.
11. Instruction Plate

The unit shall be factory tested as a complete assembly. The manufacturer shall furnish complete elementary and connection wiring diagrams, piping diagrams installation and operation instructions.

H. Sequence of Control:

1. Condensate Pumps - As the level in receiver rises, the lead pump will operate. When the level in the receiver recedes, the lead pump will stop. The next operation the lag pump will start. If the pump fails to start, the standby pump will automatically start. Under peak load conditions, both pumps shall run. The motors shall be provided with magnetic across-the-line starters equipped with general purpose enclosures and three-position, "Manual-Off-Automatic" selector switches in the cover. Automatic alternator shall be provided for duplex units.

I. The unit shall be factory tested as a complete package (submit certified test report) and shipped to the site fully assembled. The unit manufacturer shall furnish complete elementary and connection wiring diagrams, piping diagrams, assembling instructions, installation and operating instructions.

2.10 BOILER FEED UNITS

A. Each pump shall have a capacity not less than that indicated when discharging against the specified pressure. The minimum capacity of the tank shall be as indicated. The boiler feed pumping unit shall be the triplex type as indicated. The unit shall consist of:

1. Stainless steel condensate receiver

2. Two (2) boiler feed pumps with electric motor drive

3. Two (2) pump actuation flow switches

4. Accessories as specified herein

B. Equipment shall be mounted on a suitable steel base. The pump, motor, and receiving tank may be mounted on a single base with the receiver piped to the pump suctions.

C. Boiler feed pumps shall be vertical design, 2-stage pumps with stainless steel axial flow inducers for true 2' NPSH operation. Pumps shall have 250 degree F leak less mechanical shaft seal, bronze fitted, with balanced and enclosed cast bronze impeller mounted on a stainless steel shaft. Bearings shall be factory sealed and permanently lubricated. Pump motors shall be totally enclosed, 1750 RPM. Pumps shall have hydro lock wearing ring and internal cast-iron baffle to prevent pre-rotation of water in pump volute.

D. Receiver shall be stainless steel and shall be provided with all the necessary reinforced threaded openings, including condensate return, vent, overflow, and pump suction connections. Inlet strainer shall be provided either integral in the tank or separate in the inlet line to the tank. Height of receiver inlet connection shall be no greater than that of existing condensate return piping, including height of housekeeping pad. Receiver capacity to be as scheduled. Receiver shall be equipped with water level gauge, dial thermometer and all necessary tappings and openings. Furnish with a cast-iron basket type inlet strainer with vertical, self-cleaning bronze screen and large dirt pocket, and bronze butterfly type suction isolation valves between each condensate pump and receiver. Pumps shall be furnished with an automatic electric alternator.

E. Vent pipe shall be galvanized steel, and the fittings shall be galvanized malleable iron.

F. A gate valve and check valve shall be provided in the discharge connection from each pump and a strainer and gate valve shall be provided in the suction line to each pump except where pumps are directly mounted on top of the receiver.

G. Unit to be furnished with a NEMA 4 factory fabricated control panel.

Control cabinets and panels shall be designed and assembled by an approved U.L. manufacturer under N.I.T.W. industrial control panels. Panels shall bear this label. Panels shall be mounted on receiver, with full-length piano hinges and positive latch handles on doors.

Provide starters, pump running indicating lights, switches, relays, fuses, control devices, terminal blocks, etc., as required. Mount all switches, and indicators flush on the front and all components within the cabinet on a perforated sub-plate with coded wiring concealed in plastic troughs and with numbered terminal strips for easy identification of external connections. For identification of panel mounted devices, provide laminated plastic type nameplates of minimum 1" x 3" size with white letters engraved on a black surface. The control cabinet shall be factory-wired, tested and enclosed with components as required, including, but not limited to, the following:

1. Panel Power Disconnect with Cover Interlock

2. Nonfused Disconnect Switch, 1 pole, 120V AC, Heavy Duty

3. Auto/Manual/Off Selector Switch for Each Pump

4. Fused Control Circuit Transformer for Each Circuit

5. Combination Magnetic Starter, having Three Overload Relays, with Circuit Breakers and Cover Mounted Reset Button for Each Pump

6. Necessary Transformers, Relays, Contractors, Power Supplies, Fuses and Devices to Accommodate Intent of Specifications

7. Numbered Terminal Blocks or Strip

8. Engraved Nameplates for all Switches, Indicating Lamps and Components

9. Custom-made Wiring Diagram

10. Alarm contacts for Owner's DDC system.

11. Instruction Plate

The unit shall be factory tested as a complete assembly. The manufacturer shall furnish complete elementary and connection wiring diagrams, piping diagrams installation and operation instructions.

H. Controls: Manual Stanby

1. As the water level in the boiler recedes, the respective water column pump controller switch will close, starting the selected feed pump. As the level is restored, the switch will open and stop the pump. Boiler # 1 selector switch shall provide positions for OFF-CONT-PUMP 1. Boiler # 2 selector switch shall provide positions for OFF-CONT-PUMP 2.

I. The unit shall be factory tested as a complete package and shipped to the site unassembled. The unit manufacturer shall furnish complete elementary and connection wiring diagrams, piping diagrams, assembling instructions, installation and operating instructions.

2.11 VIBRATION ISOLATION AND SEISMIC RESTRAINTS

A. General

1. For each seismic restraint, provide certified calculations to verify adequacy to meet the following design requirements:

2. Ability to accommodate relative seismic displacements of supported item between points of support.

3. Ability to accommodate the required seismic forces.

4. For each respective set of anchor bolts provide calculations to verify adequacy to meet combined seismic-induced sheer and tension forces.

5. For each weldment between structure and item subject to seismic force, provide calculations to verify adequacy.

6. Restraints shall maintain the restrained item in a captive position without short circuiting the vibration isolation.

7. Seismic restraint shall be installed in accordance with the State Building Code. As a minimum provide:

a. Maximum distance between braces in the lateral direction shall be 30 feet for piping 2" and smaller and 40' for piping 2-1/2" and larger.

b. Maximum distances between braces in the longitudinal direction shall be 80 feet.

c. Tops of risers shall be provided with 4-way braces.

d. Flexible couplings shall be provided within 12" of floor and wall non-breakable penetrations and within 24" of all building expansion joints.

e. Hangers closest to the sway bracing shall be installed with an extended rod to the piping to resist upward movement of the piping.

f. Lateral sway bracing shall not be required on piping supported with rods less than 6" long.

8. Seismic bracing for lateral and longitudinal bracing may be of the splayed wire (tension type), or pipe and fixed hanger (tension/compression type), and shall be complete with manufacturer's recommended sizing, locations, and calculations. One system only (tension or compression/tension) shall be installed.

9. C clamps for attachment to the building structure must be provided with retaining straps.

10. 4-Way bracing may be of the splayed wire type or fixed angle brace with U-bolt.

a. All vibration isolators shall be the product of a single approved manufacturer or as manufactured by an individual mechanical equipment manufacturer.

b. Model numbers hereinafter specified are from Mason Industries. Other equivalent units by Consolidated Kinetics, Vibration Mountings and Controls or equal are acceptable.

B. Supply Fans, etc.

1. Steel spring and 0.3" deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.

2. Mason Model DNHS, 1" deflection.

C. Mechanical Room Piping and Pumps

1. Steel spring and double deflection neoprene element in series. The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection, Mason style 30N, with minimum 1" deflection.

2. The first three (3) pipe hanger locations on both sides (suction and discharge) of each pump, 30° swing spring and double deflection neoprene hangers, precompressed to the rated deflection, Mason style PC30N, with minimum 1" deflection.

3. For floor mounted pumps 20 HP and larger (located on slabs on grade) and all floor mounted pumps over 2 hp (not located on slabs on grade), provide concrete inertia bases with minimum 1 ½" deflection springs. Minimum clearance under base shall be 1 ½". Base size shall be large enough to include support of pump and associated vertical piping.

D. Flexible Connectors

1. Double sphere EPDM connectors with connection type to match adjacent equipment and water piping up to 175 psig and 210°F shall be equal to Mason Model SFDEJ. Units shall have construction equal to multilayered Kevlar tire cord fabric reinforcement with peroxide cured EPDM cover, liner and fabric fractioning. Units shall be rated for a minimum of 200 psig at 250°F. For flanged units, provide control rods or cables to restrict maximum travel to the manufacturer's standard limits. Flexible connectors shall be installed for pumps and elsewhere as shown on drawings.

2. For higher pressures and temperatures, up to 100 psig saturated steam, connectors shall be multi-ply stainless steel bellows type with tie rods, equal to Flexicraft. Over 100 psig steam, use expansion joints as specified in pipe expansion joint paragraph.

2.12 DUCTWORK

A. Reference Standards

1. Material, construction and installation shall meet applicable requirements of the current editions (unless otherwise shown) of the following standards and references, unless more stringent requirements are specified or shown on the Drawings (such as hazardous exhaust systems):

Standard	As Applicable to
SMACNA HVAC Duct Construction Standards (Metal and Flexible, 2005)	Sheet Metal Ductwork; Duct Liners; Adhesives; Fasteners; Flexible Ductwork
Industrial Ventilation and SMACNA Industrial Duct Construction	Dust Collection; Canopy Hoods; 4" and higher neg. pressure ductwork and 3" neg. pressure round ductwork
SMACNA Thermoplastic Duct (PVC) Construction Manual	PVC Ductwork
SMACNA HVAC Air Duct Leakage Test Manual	Duct Leakage Testing
NFPA 90A	Fire Dampers; Fire Resistance Standards for Ducts and Liners
NFPA 96	Kitchen Hood Exhaust Ductwork
NFPA 45	Laboratories Using Chemicals
SMACNA Guidelines for Welding Sheet Metal	Welded Galvanized, Black Iron and Stainless Steel Ductwork

B. General

1. Provide all required supporting and hanging devices to attach entire combustion air system including ductwork and fan, and to prevent vibration. Include vertical and horizontal supports as required by codes to meet minimum applicable earthquake resistance standards.

2. Ductwork shall be free from vibration at all times.

3. No pipe, conduit, hanger, Architectural element or structural member shall pass through duct without Engineer's written approval. Where the pipe or conduit cannot possibly be relocated and when written approval has been obtained, increase duct size to maintain full cross-sectional area at point of interference. Provide streamlined enclosure for pipe or conduit, per SMACNA.

4. All offsets and transformations necessary due to structural conditions shall maintain the full cross-sectional area of ductwork shown on Drawings.

C. Ductwork Pressure Class, Seal Class, and maximum design velocities shall be as shown on the drawings and as specified herein.

D. Duct Construction

1. Unless otherwise specified, use the pressure classifications for the types of ductwork as shown on the drawings.

2. Non-welded duct seals and joints shall be as listed by SMACNA or Ductmate for the specified pressure and seal classes.

3. Material: Unless otherwise specified or shown on drawings, all ductwork shall be fabricated from G-60 galvanized steel or 316 stainless steel. Galvanized steel shall meet AST A525 and A527 standards and stainless steel shall meet ASTM A240 standards.

4. Elbows and Bends:

a. Wherever possible, all elbows and bends for rectangular ducts shall be full radius (centerline radius of 1.5 times duct width). Elbows for grease exhaust shall have a centerline radius of 2.0 times duct width, unless this physically can't fit, then full radius may be used. Turning vanes and mitered elbows are not allowed.

b. Where centerline radius must be less than 1.5 times duct width (on supply, return and exhaust ductwork other than grease exhaust) in the plane of bend, elbows shall be minimum 2" inside (not centerline) radius throat with radius heel and full length splitter vanes installed as shown on drawings or per SMACNA. Splitter vanes are not required on bends less than 30°. When centerline radius (r) divided by the duct width (w) is less than 1.5, provide the following number of splitter vanes:

r/w	No. of Vanes for Elbow Angle of 45° - 90°	No. of Vanes for Elbow Angle of 30° - 44°
1.49 – 0.70	1	0
0.69 - 0.60	2	1
Under – 0.60	3	2

5. General Service Duct Connectors: Flexible duct connectors approximately 6 inches in width shall be provided where sheet metal connections are made to fans or where ducts of dissimilar metals are connected. For rectangular ducts, the flexible material locked to metal collars shall be installed using normal duct construction methods. The composite connector system shall comply with NFPA 701 2004 (Standard of Methods of Fire Tests for Propagation of Textiles and Film) and be flame retardant.

E. Ductwork Accessories

1. Access Doors shall be rated for the duct pressure class they are installed in. For hazardous exhaust systems, minimum gauge shall be the same as the duct.

a. Frame: same materials as duct with seal

b. Door: hinged, with exterior (and, for insulation ducts, interior) panel.

c. Locks: doors 16" and under, one lock doors over 16", two locks

d. Seals: foam gaskets for ultra-low leakage

e. Insulation (for insulation ducts): ½" foam board with aluminum foil face, 0.12K at 75°F.

f. Manufacturer: Ruskin model ADH-2, Inland Steel, Miami Carey or approved equal.

2. Sizes:

SCHEDULE OF DUCTWORK ACCESS DOOR SIZES	
Duct width (inches)	**Access door size (inches)**
<=10	10 x 6
12 - 16	12 x 8
Over 16	18 x 24

3. Provide at all fire dampers, air inlets, motorized dampers, smoke detectors, duct mounted coils, humidifiers, air flow switches, where specified for cleanouts and where shown on the drawings.

4. Manual Volume Dampers

a. Manual volume dampers shall be provided where shown on the Drawings at every branch take off from the main duct, and elsewhere as required by the Balancing Sub Subcontractor, and shall be single or multiple blade type with sleeve bearings, interlocking blades and frame shall be of the same material as the ductwork. In ducts over 15" deep provide multiple opposed blade type, gang operated dampers with a maximum blade width of 8". Damper blades shall be fabricated of 16 gauge steel with hemmed edges, and a maximum length of 48". Damper operating rod shall be full blade length extended through the duct to externally mounted bearing plates. On insulated ductwork, bearing plates shall be installed flush with insulation finish and fastened to the duct. Operating lever shall be of the indicating type with locking quadrant.

b. For dampers in inaccessible locations, such as above gypsum ceilings provide remote cable actuated dampers.

5. Motor Operated Control and Smoke Dampers and Actuators

a. Motor operated control and smoke dampers and actuators shall be furnished by the Automatic Temperature Control Sub Subcontractor and installed by the Sheet Metal Sub Subcontractor unless specified as part of a piece of equipment.

6. Blankoff Plates

a. Any blankoff plates or conversions required for mounting control dampers or coils shall be the responsibility of the Sheet Metal Sub Subcontractor.

7. Insulated Metal Panels

a. Provide 18 gauge, insulated double wall sandwich construction, 1½" thick where called for on the Drawings and for blanking off unused portions of wall louvers.

8. Test Openings

   a. Provide instrument test opening enclosures in the ductwork at the discharge of each fan and fan coil, inlet of each fan and fan coil, and where directed by the Balancing Sub Subcontractor. The enclosures shall be installed before the application of the insulation and shall be of the proper height to extend beyond the insulation. The attachment of the test opening enclosure shall be made airtight.

9. Flexible connections shall be 6" wide connections constructed of heavy glass fabric double coated with neoprene. Flexible connections shall meet the requirements of the National Board of Fire Underwriters.

F. Bird Screens and Frames

1. Bird screens shall conform to ASTM E 437, Type I, Class 1, 2 by 2 mesh, 0.063 inch diameter aluminum wire or 0.031 inch diameter stainless steel wire. Frames shall be removable type either stainless steel or extruded aluminum.

2.13 LOUVERS

A. Furnish and install fixed drainable 6” deep aluminum louvers of the sizes and capacities as shown on the Contract Drawings.

B. The fixed wall louvers shall have heads, sills, jambs and mullions of one (1) piece structural members of 6063-T5 alloy, 0.125 inch (3.18 mm) thick with integral caulking slot and retaining beads. Mullions shall be sliding interlock type with double integral internal drains. Drainable blade shall be of the same material and shall be minimum 0.081 inch (2.06 mm) thick with front lip gutter and recessed second gutter designed to catch and direct water to jamb and mullion drains. Closed cell PVC compression gaskets to be provided between bottom of mullion or jamb and top of sill to insure leak tight connections. Structural supports shall be designed to carry a wind load of not less than thirty (30) pounds per square foot. All fasteners shall be stainless steel or aluminum. All louvers shall be furnished with aluminum mesh insect screen. Screening shall be replaceable.

C. Manufacturer to submit AMCA500 test data on a 4 foot x 4 foot unit showing that the louver shall pass 1010 FPM free areas velocity at a pressure drop of less than 0.01 ounces of water per square foot of free area. AMCA data shall also show a 4 foot x 4 foot unit to have a minimum of 8.8 square feet free area.

D. Louvers shall be finished with 2 coats of baked acrylic enamel paint, containing a minimum of 50% Kynar. Submit color chips to Architect and Engineer for approval.

E. On louvers that call for blank-off panels, the panels shall be a rigid insulation board type minimum of two (2) inch thick with a minimum twenty (20) gauge aluminum protective facing on both sides.

F. Louvers shall be Ruskin Model ELF 6375X, Arrow United Industries Model EA-615-D, American Warming and Ventilating Model LE-31 or equal by Construction Specialties.

G. Installation shall meet all manufacturers requirements.

2.14 FACTORY PAINTING

A. Units which are not of aluminum, stainless steel, or galvanized construction (according to ASTM A 123 or ASTM A 525) shall be factory painted with a corrosion resisting paint finish. Internal and external ferrous metal surfaces shall be cleaned, phosphatised and

coated with a paint finish which has been tested according to ASTM B 117, ASTM D 1654, and ASTM D 3359. Evidence of satisfactory paint performance for a minimum of 125 hours for units to be installed indoors and 500 hours for units to be installed outdoors shall be submitted. Rating of failure at the scribe mark shall be not less than 6, average creepage not greater than 1/8 inch. Rating of the inscribed area shall not be less than 10, no failure. On units constructed of galvanized steel which have been welded, exterior surfaces of welds or welds that have burned through from the interior shall receive a final shop docket of zinc-rich protective paint according to ASTM D 520 Type I.

2.15 INSULATION

A. Scope: Provide all labor, equipment, materials and accessories, and perform all operations required, for the correct installation of insulation on the following systems and all other necessary items connected into the systems subject to condensation, loss of heat, or personnel protection (above 120 degrees F):

1. Piping insulation, jackets and accessories (including all valves and fittings with easily removable sections for maintenance of strainers, balance valves, and unions).

2. Equipment and flue gas breeching insulation, and covering (including easily removable sections for maintenance).

3. Ductwork insulation, jackets, and lining (including all fittings).

B. Environmental Requirements: Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

C. Quality Assurance: Insulation materials must be asbestos free, UL listed, and manufactured at facilities certified and registered to conform to ISO 9000 Quality Standard. All insulating products and jackets shall carry a 25/50-flame spread/smoke developed rating as tested in accordance with ASTM E 84.

D. Workmanship: All insulation shall be installed by a licensed applicator and applied in accordance with the manufacturer's recommendations. All work shall comply with all applicable federal, state, and local codes including, but not limited to, OSHA. All work shall conform to industry and trade accepted standards for commercial and industrial insulations. Verify that piping, heat trace, and ductwork has been tested (including applicable pressure/leakage tests) before applying insulation materials. Surfaces to be insulated shall be cleaned free of dirt, scale, moisture, oil and grease. No vapor barrier leaks or insulation voids will be accepted. Continue insulation vapor barrier through penetrations except where prohibited by code. All fire rated walls and penetrations shall be sealed with fire stopping. Locate insulation and cover seams in least visible locations. Neatly finish insulation at supports, protrusions, and interruptions. For all systems requiring a vapor barrier seal all terminations including fittings, wall penetrations, and supports with vapor barrier mastic such as Foster 30-35 or equal. In addition, in brine or chilled water pipe systems vapor seal pipe terminations every four pipe sections, using Foster 30-35 or equal. Bevel and seal ends of insulation at equipment, flanges, and unions. Where insulation is used over stainless surfaces, the material shall be chlorine free.

E. Delivery and Storage of Materials

1. Deliver all materials to the job site and protect the insulation against dirt, water, chemical and mechanical damage before, during and after installation. Do not install damaged insulation and remove it from the job site.

2. Deliver insulation, coverings, cements, adhesives coatings etc. to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products, name of manufacturer and brand.

3. Installed insulation that has not been weatherproofed shall be protected from inclement weather by an approved waterproof sheeting installed by the Contractor. Any water-damaged insulation shall be removed and replaced by the Contractor at no additional cost.

F. Manufacturers: Johns Manville (JM), CertainTeed, Owens-Corning, 3M, Armstrong, Knauf, or approved equal. Note that the listed manufacturers may not be able to supply all the insulation products required for the project. Unless otherwise noted, JM insulation products are listed to provide the minimum standards required for each type of insulation.

G. Pipe Insulation: Provide the following products depending on temperature of each system. Insulation shall be marked to show the locations of all unions, break flanges, strainers, check and balancing valves.

1. For piping with a service temperature between 40°F and 600°F such as hot water, dual temperature water, make-up and feed water, blow-down, boiler feed water, steam, and steam condensate, provide glass fiber insulation equal to JM Micro-Lok. Insulation shall be rigid molded and noncombustible, meeting ASTM C 547, Type I. K-factor shall be 0.23 at 75°F mean temperature. All purpose vapor retardant jacket shall be JM AP-T PLUS. Jacket shall be white kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples (coated with vapor barrier mastic for all dual temperature water systems).

H. Minimum pipe insulation thicknesses shall be as shown on the drawings.

I. Field Applied Piping and Fitting Jackets

1. Provide covers for insulation of all pipe fittings (i.e. elbows, tees, end caps, reducers, unions, flanges, mechanical joints), strainers and valves with surface temperatures between –20°F and 150°F (all water, low pressure steam and condensate systems with glass fiber insulation). Provide easily removable sections for cleaning and maintenance of unions, balancing valves, and strainers. Fitting covers shall be 30-mil thick white PVC equal to JM Zeston 2000 molded high impact, UV resistant covers. Attach with water-resistant pressure sensitive color matching vinyl tape to maintain vapor barrier. Insulate all fittings per manufacturer's recommendations to prevent surface temperature from exceeding the 150°F limit.

2. Protect all piping insulation that passes through walls and floors, all outdoor pipe insulation, and elsewhere where called for on drawings with 0.016 inch thick smooth or embossed aluminum sheet jacket or 0.01 inch thick smooth or corrugated type 304 stainless steel or 30 mil thick Zeston 2000 perma-weld high impact UV resistant PVC jacket with perma-weld fitting covers. Seams shall be on the bottom half of the pipe arranged to shed water. Provide minimum 2-inch overlap for all longitudinal and transverse joints. All seams of outdoor jacket shall be filled with waterproof adhesive. Provide 1" wide draw bands (same material as jacket) on 12" centers.

J. Equipment and Flue Gas Breeching Insulation - General:

1. Apply insulation as close as possible to equipment by grooving, scoring, and beveling insulation, if necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retardant cement.

3. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.

4. Cover fiber glass and calcium silicate insulation on warm or room temperature equipment with 0.016 inch thick (smooth or embossed) aluminum jacket, or with metal mesh and finish with heavy coat of insulating cement or mastic (such as Foster 35-00).

5. For equipment located outdoors, in mechanical equipment rooms or in finished spaces insulated with fiber glass, finish with perma-weld Zeston 2000 jacketing (up to a surface temperature of 150°F) and fitting covers or 0.016 inch thick (smooth or embossed) aluminum jacketing. Outdoor aluminum jacketing seams shall be on the bottom half of the pipe arranged to shed water. Provide minimum 2-inch overlap for all longitudinal and transverse joints. All seams of outdoor jacket shall be filled with waterproof adhesive.

6. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

7. Provide easily removable/replaceable sections (without damage) of insulation for areas that will require maintenance, repair, or cleaning, such as pumps (bearings, seals, and impellers), heat exchangers (tube pull), strainers (basket pull), expansion tanks (bladder access), etc.

K. Equipment and Flue Gas Breeching Insulation: Provide the following insulation types for the listed equipment.

1. Insulate and pump casings; and condensate receivers up to 250°F with 2” thick flexible or rigid fiber glass insulation. Flexible blanket shall be equal to JM type 812 Spin-Glas meeting ASTM C 553, Type III, 1.5 lb/cu ft density, with K-factor of 0.24 at 75°F mean temperature. Flexible board insulation shall be equal to JM 814 Spin-Glas meeting ASTM C 612, Type IA & IB, 3.0 lb/cu ft density, with K-factor of 0.23 at 75°F mean temperature.

2. Insulate higher temperature equipment and flue gas breeching between 600°F and up to 1200°F with 5” thick rigid molded hydrous calcium silicate block insulation. Insulation shall be equal to JM Thermo-12/Gold meeting ASTM C 533, non-combustible, asbestos free (color coded throughout material thickness) with K-factor of 0.41 at 300°F mean temperature when tested in accordance with ASTM C 177 and C 518. Insulation shall be securely banded in place, tightly butted, joints staggered and secured with 16 gauge galvanized or stainless steel wire or 1/2" x .015" galvanized steel bands on 12" maximum centers for large areas.

L. Ductwork Insulation – General

1. Provide duct and plenum insulation of type(s) indicated in these specifications. Minimum total R-value for each location and duct system shall be as shown on the drawings.

2. R-values shown on drawings may be obtained by adding the individual R-values of both the lining (where shown or used) and external duct insulation.

M. Ductwork Insulation (External Wrap) - General

1. Where service access is required, bevel and seal ends of easily removable insulation. Removable sections shall also be provided (and labeled) at all duct test holes.

2. The underside of duct work 24" or greater shall be secured with mechanical fasteners and speed clips spaced approximately 18" on center. The protruding ends of the fasteners should be cut off flush after the speed clips are installed, and then, when required, sealed with UL listed tapes or vapor-retardant adhesive.

N. Ductwork Insulation (External Wrap): Provide the following insulation types for the listed ductwork.

1. Insulate concealed ducts and plenums, depending upon the required R-value (see drawings) for the duct and its location, with 0.75 lb/cu ft dense fiber glass insulation equal to JM Microlite or Owens Corning SOFTR Type 75. Insulation shall meet ASTM C 1290 Type III, flexible blanket with a maximum K-factor of 0.30 at 75°F mean temperature. Operating service temperature range shall be 40°F to 250°F. Vapor barrier jacket shall be FSK aluminum foil reinforced with fiberglass scrim laminated to UL rated kraft paper with maximum permeance of 0.02 perms. Jacket shall be secured with UL listed pressure sensitive tape and/or outward clinched expanded staples (with minimum 2 inch lapped vapor barrier) and vapor barrier mastic as needed. K-factors and R-values listed assume 25% compression during installation. The minimum R-value based on thickness, shall be:

Thickness	R-value
1 ½”	4.2
2”	5.6
3”	8.3

2. Insulate exposed ducts and plenums, depending upon the required R-value (see drawings) for the duct and its location, with 3.0 lb/cu ft dense fiber glass insulation. Insulation shall be equal to JM Type 814 Spin-Glas or Owens Corning Type 703 meeting ASTM C 612, Type 1A & IB; rigid board with a maximum K-factor of 0.23 at 75°F mean temperature. Operating service temperature range shall be 0°F to 450°F. Vapor barrier jacket shall be AP type (kraft paper bonded to aluminum foil, reinforced with fiber glass yarn) with maximum permeance of 0.02 perms. Jacket shall be secured with UL listed pressure sensitive tape and/or outward clinched expanded staples (with minimum 2 inch lapped vapor barrier) and vapor barrier mastic as needed. The minimum R-value, based on thickness, shall be:

Thickness	R-value
1 ½”	6.5
2”	8.6

2.16 METAL CHIMNEYS AND FLUES

A. Per 248 CMR 5.00 and 7.00, provide the services of a licensed plumber or gasfitter to be responsible for, supervise, and/or install flue venting system(s) for all gas-fired equipment based on the equipment capacity. The licensed plumber or gasfitter shall obtain a gas fitting permit in compliance with 248 CMR 3.00 as required by the Massachusetts Fuel Gas and Plumbing Code.

B. Boilers and water heaters (without draft hoods, under 85% efficiency unless otherwise noted on drawings).

1. Furnish and install, as shown on the drawings, a positive pressure, dual wall, insulated breeching/stack system.

2. Breeching to be round, double wall, all metal, gas and liquid-tight factory built component system, tested and listed by UL 103 for use with building heating equipment, burning gas, solid or liquid fuels as described in NFPA-85A, B, D and NFPA-211.

3. Breeching inner shell (gas carrying pipe) to be 0.035" 304 stainless steel for liquid fuel or 316 stainless steel for solid fuels and heavy oil. Outer shell to be minimum 0.026" aluminized (indoors only) or 304 [316] stainless steel (outdoors or indoors). Both inner and outer shell construction to be all welded (tacked joints are unacceptable) and all vertical seams to be full strength 100% penetration square groove weld in accordance with AISC and/or AWS specifications and codes. Inner and outer walls to be connected by "J" clips, which shall allow for unobstructed thermal expansion of inner and outer walls.

4. Insulating barrier to consist of two (2) inches of six (6) pounds per cubic foot density insulation secured to the inner shell with steel straps.

5. Inner shell to be sealed by use of 304 stainless steel bands and high-temperature sealant. The outer shell to be joined together with sealant and one piece 304 stainless steel draw bands. Joint sealant to be supplied by the manufacturer for the anticipated temperature range.

6. System to be complete with elbows, tees, laterals, tapered increasers/reducers, thimbles, support plates, expansion sections, flange adapters, boiler kits, and all necessary hangers, guying and supports. Final system design/layout to be by breeching manufacturer. Submit shop drawings.

7. System to be warranted against defects in materials and workmanship for a period of twelve (12) years from date of original installation.

8. System shall be as manufactured by Schebler, Selkirk Metalbestos, Ampco, Metal-Fab, or approved equal providing they meet the specified requirements.

PART 3 - EXECUTION

3.00 DEMOLITION

A. The existing facility will continue to operate during all phases of the demolition work and subsequent construction. No interruption of the systems will be permitted without prior approval of the Owner's Representative.

B. All shutdowns shall occur on a Saturday or Sunday and shall not be more than 24 hours duration.

C. Submit proposed methods and sequence of operations for the selective demolition work to the Owner's Representative for review prior to the start of the work.

D. Perform all demolition while ensuring minimum interference with adjacent occupied areas.

E. Where sections of a system are to be removed and the system serves other areas of the building that are outside the scope of the work, perform the following:

1. Coordinate the temporary shutdown of the system with the Owner's representative.

2. Install supports in the remaining active sections of the system as required by the removal of nearby supports associated with the demolition.

3. Isolate the system.

4. Cap the remaining system section, leaving the remainder of the system active.

F. Provide temporary shoring or bracing during the demolition work to prevent movement, settlement, or collapse of the system or adjacent systems due to the work.

G. Promptly repair any damage caused to adjacent facilities or areas that are designated to remain at no additional cost to the Owner.

H. Equipment:

1. Coordinate with the Contractor and Subcontractors to provide disconnection prior to equipment removal.

2. Remove equipment by unfastening at the supports or attachments. Then remove the attachments from the building, leaving no component of the original installation.

3. The Owner shall choose to take possession of the equipment or not. If the Owner chooses not to take possession of the equipment, the Subcontractor shall remove the equipment and dispose of the equipment in accordance with Paragraph H specified below.

4. Exercise care with equipment that is to be relocated or turned over to the Owner, examine the equipment before removal in the presence of the Owner's representative to determine its condition. Make a record of any marks, etc. by a photograph or videotape acknowledged by the Owner's representative.

5. Install relocated equipment to ensure no damage.

6. Equipment to be turned over to the Owner: Deliver to an on-site location designated by the Owner, and obtain acknowledgment of receipt in good condition.

I. All equipment, etc., not turned over to the Owner shall be put into the General Contractor's dumpsters; become the property of the General Contractor, and shall be removed from the site by the General Contractor. For equipment containing any refrigerant, it shall be reclaimed for recycling. Any hazardous materials such as mercury from thermometers or thermostats; ethylene glycol; or lead shall be properly disposed of, following EPA guidelines.

3.01 GENERAL

A. Install all items specified under PART 2 - PRODUCTS, according to the manufacturer's requirements and best quality recommendations, shop drawings, the details as shown on the Drawings and as specified in this specification section.

B. Install all work so that parts requiring inspection, replacements, maintenance and repair shall be readily accessible. Minor deviations from the Drawings may be made to accomplish this, but any substantial change shall not be made without prior written approval from the Owner.

C. Equipment bases mounted on concrete slabs and pads, or mounted on stands, gratings, platforms, or other, shall not be set in any manner, except on the finished and permanent support.

D. Support of equipment on studs or other means, and the placing or building of the supporting slab, pad, pier, stand, grating, or other "to the equipment", is prohibited.

E. Concrete supporting structures shall have been constructed and cured a minimum of 14 days before equipment is mounted.

F. All welding done under this section shall be performed by experienced welders in a neat and workmanlike manner. All welding done on piping, pressure vessels and structural steel under this Section shall be performed only by persons who are currently qualified in accordance with ANSI Code B31.9 and B31.1 for Pressure Piping and certified by the AWS, ASME or an approved independent testing laboratory, and each such welder shall present certificate attesting his/her qualifications to the Engineer's representative whenever requested to do so on the job.

G. All pipe welding shall be oxyacetylene or electric arc. High test welding rods suitable for the material to be welded shall be used throughout. All special fittings shall be carefully laid out and joints shall accurately match intersections. Care shall be exercised to prevent the occurrence of protruded weld metal into the pipe. All welds shall be of sound metal free from laps, cold shots, gas pockets, oxide inclusions and similar defects.

H. All necessary precautions shall be taken to prevent fire or damage occurring as the result of welding operations.

I. Care shall be taken when working on the roof. Protect the roof from damage.

3.02 IDENTIFICATION

A. General

1. All piping, ductwork, equipment, panels, and valves furnished and/or installed under this Section of the Specifications and Specification Section 250000 shall be marked for ease of identification.

2. Equipment, panel, and valve labels shall be 4” by 2½” and designed to withstand temperatures of -22°F to +392°F. Labels are designed to be resistant to water, acid/solvent, dirt and oil repellant. Labels shall be high tensile Graphiplast® tearing strength as well as scratch resistant and affixed to equipment by cable ties or adhesive clear pouch. Location of label shall be at unit control panel, next to factory nameplate, lower right-hand corner of panel, and/or tie wrapped to localize disconnect at unit. Installation instructions shall be provided with the labels to assure durability (i.e., clean surface prior to adhering adhesive label, leave cable ties loose on outside of equipment to allow freedom of movement due to the elements, etc.) and with adhesive tags not secured when temperatures are below 45°F ambient temperature.

3. Samples of stickers together with color schedules shall be submitted during the submittal phase of this project.

4. Marking shall be done using self-adhering (screw or rivets for equipment) labels applied to clean, smooth surfaces. All lettering shall have sharply contrasting background for ease of identification. Colors shall be in accordance with ANSI A13.1 Standards. Samples of stickers together with color schedules shall be submitted for approval.

B. Ductwork

1. Ductwork marking shall be prominently mounted on all ductwork. Marking spacing shall be every 20 feet, at all changes in direction and on both sides of wall penetrations. For ductwork in shafts, marking shall be at each floor.

2. Ductwork markers shall indicate the direction of airflow with ductwork designation (supply, exhaust, return) and which system (i.e. VAV-1, AHU-1, EF-1, etc.) it is connected to.

C. Pipe Identification

1. Provide color-coded pipe identification markers on all piping in the building installed under this Section. Pipe markers shall be heavy plastic faced cloth labels with heat resistant backing, "Set Mark" by Seton Nameplate Corporation, Zipper Tubing Co., or equal by the W. H. Brady Company or approved equal.

2. Provide each pipe with markers indicating the service, size (in inches), and arrow markers to indicate the direction(s) of flow.

3. Piping mains shall be labeled at 20 foot intervals and on entrance and exit from the Mechanical Room, adjacent to each valve and at both sides of wall penetrations. This work shall be done after finish painting has been completed.

4. The following color coding shall be used with names in black letters on backgrounds indicated:

SCHEDULE OF PIPING IDENTIFICATION		
Service	**Legend**	**Background Color**
Steam	S (xx)	Yellow (note: xx=psig of steam system)
Steam condensate	C (xx)	Yellow (note: xx= psig of steam system)
Pumped steam condensate	PC	Yellow
Steam Relief	STM/RLF	Yellow
Make up water	MUW	Green

5. In general, a 2" high legend shall be used for pipe lines 4" diameter and larger, and a 3/4" high legend shall be used for pipe lines 3" diameter and smaller.

6. All markers shall be OSHA approved.

D. Equipment Identification (by Unit Manufacturer)

1. Equipment marking shall be prominently located and securely attached with screws or rivets (no adhesives or cements are permitted) on the normally visible side of the equipment.

2. Equipment identification designations shall be taken from equipment callouts as shown on drawings and coordinated with the Owner's facility group to assure designations match up with Owner's maintenance management system identification database.

3. Provide on the label (or on a prominently located second label) all required routine maintenance action (per manufacturer). Label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product.

E. Valve Tags

1. All valves on pipes of every description shall have numbering tags. The valve numbers shall correspond with numbers indicated for valves and controls on two-printed Valve Lists prepared using electronic database by the HVAC Subcontractor. These printed lists shall state the numbers and locations of each valve and control and the section, fixture or equipment which it controls, and other necessary information, such as requiring the opening or closing of another valve when one valve is to be opened or closed.

2. Provide flow diagrams showing all valves. Use the Valve List for callouts of all valves on the flow diagrams, prepared in a form to meet the approval of the Engineer. Include this info in the operating and maintenance (O&M) manuals, and, for all mechanical rooms, provide the information laminated, mounted and framed under glass at the direction of the Owner. All valve interior diameters shall be shown in the O&M manuals and on the final Record Drawings.

3. Valve tags shall have neat circular black and white laminated fibre-engraved white showing through tags of at least 1 ½" in diameter, attached with a brass hook to each valve stem. Stamp on these valves tags in letters, as large as practical, the number of the valve and the service such as indicated on the "Valve List". The numbers on each service shall be consecutive. All valves on tanks and pumps shall be numbered by 3" black and white laminated fibre-engraved white showing through discs with white numbers 2" secured to stem of valves by means of brass hooks or small solid link brass chain.

3.03 PIPING

A. General

1. Piping shall be cut accurately to measurements established at the jobsite, shall be installed without cold springing, and shall properly clear windows, doors and other openings and electrical gear. Cutting or other weakening of the building structure to facilitate piping installation will not be permitted. Piping shall be free of burrs, oil, grease, and other foreign matter. Piping shall be installed to permit free expansion and contraction without damaging building structure, pipe, joints, or hangers. Changes in direction shall be made with fittings. Vent pipes shall be carried through the roof and shall be properly flashed.

2. Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. A waterproofing clamping flange shall be installed as indicated. Sleeves shall not be installed in structural members except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its specified wall, floor, or roof, and shall be cut flush with each surface, except that sleeves through floors and roofs shall extend above the top surface at least 6 inches for proper flashing or finishing. Membrane clamping rings shall be provided where membranes are penetrated. Unless otherwise indicated or required by the sealing system, sleeves shall be sized to provide a minimum clearance of 1/4 inch between bare pipe and sleeves or between jacket over insulation and sleeves. Sleeves in bearing walls, waterproofing membrane floors, and wet areas shall be galvanized steel pipe. Sleeves in nonbearing walls, floors, or ceilings may be galvanized steel pipe or galvanized sheet metal with lock-type longitudinal seam. Except in pipe chases or interior walls, the annular space between pipe and sleeve or between jacket over insulation and sleeve in non-fire rated walls, partitions, and floors shall be sealed as indicated and specified. Metal jackets shall be provided over insulation passing through exterior walls, fire

walls, fire partitions, floors, or roofs, shall not be thinner than 0.006 inch thick aluminum, if corrugated, and 0.16 inch thick aluminum, if smooth, and shall be secured with aluminum or stainless steel bands not less than 3/8 inch wide and not more than 8 inches apart.

3. If the pipe turns from vertical to horizontal, the sealant strip shall be run to a point just beyond the first elbow. When penetrating waterproofing membrane for floors, the metal jacket shall extend from a point below the backup material to a minimum distance of 2 inches above the flashing. For other areas, the metal jacket shall extend from a point below the backup material to a point 12 inches above floor; or when passing through walls above grade, jacket shall extend at least 4 inches beyond each side of the wall.

4. Pipes Passing through Waterproofing Membranes: In addition to the pipe sleeves referred to above, pipes passing through roof or floor waterproofing membranes shall be provided with a 16 ounce copper flashing, each within an integral skirt or flange. Flashing shall be suitably formed, and the skirt or flange shall extend not less than 8 inches from the pipe and shall set over the roof or floor membrane in a troweled coating of bituminous cement. The flashing shall extend up the pipe a minimum of 10 inches above the roof or floor. The annular space between the flashing and the bare pipe or between the flashing and the metal-jacket-covered insulation shall be sealed as indicated. Pipes passing through floor waterproofing membrane shall be installed through a galvanized steel sleeve. The annular space between pipe and sleeve or conduit and sleeve shall be sealed by a modular mechanical-type sealing assembly (equal to Link-Seal). The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe/conduit and sleeve with corrosion protected carbon steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide a water-tight seal between the pipe/conduit and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe/conduit and sleeve involved. The Contractor shall provide sleeves of the proper diameters and gauge.

B. Water Piping:

1. Unless otherwise indicated, horizontal water piping shall pitch down in the direction of flow with a grade of not less than 1 inch in 40 feet and condensate drain piping shall pitch down in direction of flow with a grade of not less than 1 inch in 10 feet. Open ends of pipelines and equipment shall be properly capped or plugged during installation to keep dirt or other foreign materials out of the systems. Pipe not otherwise specified shall be uncoated.

2. Unless otherwise allowed in Part 2 Piping and Fittings, or shown on the drawings, connections to equipment shall be made with malleable-iron unions or flanges for steel pipe 2 inches or less in diameter and with flanges for pipe 2-1/2 inches or more in diameter. Unions for copper pipe or tubing shall be brass or bronze. Connections between ferrous piping and copper piping shall be electrically isolated from each other with dielectric waterway as specified in the Part 2 Piping and Fittings section of this specification. Where the temperature or pressure of the system is beyond the waterway limits, dielectric couplings or other approved methods shall be used. Reducing fittings shall be used for changes in pipe sizes.

3. Pipe joints between sections of pipe shall be as listed in the Part 2 Piping and Fittings section in the Schedules for Piping and Fittings tables. Exceptions are

pipe and fittings installed in inaccessible conduits or trenches beneath concrete floor slabs or in difficult to access locations such as shafts which shall be welded, soldered or brazed. Some joint types or materials listed may have lower pressure and/or temperature limits and Contractor shall ensure they are only used where those limits will NOT be exceeded.

4. Welded joints shall be fusion welded in accordance with ASME B31.1 for all water piping over 160 psig and any other piping where B31.1 is required. All other piping shall be welded in accordance with ASME B31.9 unless otherwise stated. Changes in direction of piping shall be made with welding fittings only; mitering or notching pipe to form elbows and tees or other similar type construction will not be acceptable. Branch connections may be made with either welding tees or forged branch outlet fittings, either being acceptable without size limitation. Branch outlet fittings, where used, shall be forged, flared for improvement flow where attached to the run, reinforced against external strains, and designed to withstand full pipe bursting strength.

    a. Beveling: Field and shop bevels shall be in accordance with the recognized standards and shall be done by mechanical means or flame cutting. Where beveling is done by flame cutting, surfaces shall be cleaned of scale and oxidation before welding.

    b. Alignment: Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Height shall be so aligned that no part of the pipe wall is offset by more than 20 percent of the wall thickness. Flanges and branches shall be set true. This alignment shall be preserved during the welding operation. If tack welds are used, welds shall be of the same quality and made by the same procedure as the completed weld; otherwise, tack welds shall be removed during the final welding operation.

    c. Defective Welding: Defective welds shall be removed and replaced. Repairing of defective welds shall be in accordance with the applicable standard: ASME B31.9 or B31.1.

    d. Electrodes: After filler metal has been removed from its original package it shall be protected or stored so that its characteristics or welding properties are not affected. Electrode material shall be as required for the pipe material. Electrodes that have been wetted or that have lost any of their coating shall not be used.

5. Flanges and unions shall be faced true, and made square and tight. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16 inch thickness, full-face or self-centering flat ring type. The Gaskets shall contain aramid fibers bonded with styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR). NBR binder shall be used for hydrocarbon service. Union or flange joints shall be provided in each line immediately preceding the connection to each piece of equipment or material requiring maintenance such as coils, pumps, control valves, and other similar items.

6. Threaded joints shall be made with tapered threads properly cut and shall be made perfectly tight with Teflon (polytetrafluoroethylene) tape or equal. Teflon tape shall be non-toxic and rated for piping systems with temperatures to at least 450 degree F and pressures to at least 1,000 psig. Tape shall be applied the male threads only, and in no case to the fittings.

7. Malleable iron pipe press fittings equal to IMS Fastlock may be used (where allowed in the Part 2 Piping and Fittings section of these specifications) and shall be installed in accordance with the manufacturer's guidelines and recommendations. Pipe shall be certified for use with the IMS Fastlock system. Pipe shall be square cut, properly deburred, and cleaned. Pipe ends shall be marked at the required location to ensure full insertion into the coupling or fitting during assembly. Use an IMS Fastlock approved tool with the proper sized jaw for pressing. Prior to putting the system into operation, Contractor shall perform an air pressure test to provide quick and easy identification of connections which have not been pressed.

8. Soldered and Brazed Joints: Pipe and tubing shall be cut square and burrs shall be removed. Both inside of fittings and outside of tubing shall be cleaned with an abrasive before sweating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connection. Changes in direction of piping shall be made with soldered or brazed fittings only. Solder and flux shall be lead free. Joints for soldered fittings shall be made with silver solder or 95:5 tin-antimony solder. Cored solder shall not be used. Joints for brazed fittings shall use brazing alloys with strength equal to B-Ag alloy and have a melting point above 1000 degrees F. Swing joints or offsets shall be provided on all branch connections, mains, and risers to provide for expansion and contraction forces without undue stress to the fittings or to short lengths of pipe or tubing.

C. Steam Piping

1. Unless otherwise indicated, horizontal steam piping shall pitch down in direction of flow with a grade of not less than 1 inch in 20 feet, and steam condensate piping shall pitch down in direction of flow with a grade of not less than 1 inch in 10 feet. Open ends of pipelines and equipment shall be properly capped or plugged during installation to keep dirt or other foreign materials out of the systems. Pipe not otherwise specified shall be uncoated.

2. Unless otherwise specified or shown, connections to equipment shall be made with malleable-iron unions or flanges for steel pipe 2 inches or less in diameter and with flanges for pipe 2-1/2 inches or more in diameter. Reducing fittings shall be used for changes in pipe sizes. In horizontal steam pipes, reducing fittings shall be the eccentric type to keep the pipes flat on bottom (FOB).

3. Pipe joints between sections of pipe shall be as listed in the Part 2 Piping and Fittings section in the Schedules for Piping and Fittings tables. Exceptions are pipe and fittings installed in inaccessible conduits or trenches beneath concrete floor slabs or in difficult to access locations such as shafts which shall be welded. Some joint types or materials listed may have lower pressure and/or temperature limits and Contractor shall ensure they are only used where those limits will NOT be exceeded. Grooved mechanical joints shall not be used.

4. Welded joints shall be fusion welded in accordance with ASME B31.1 for steam boiler external piping over 15 psig, all steam and condensate piping over 150 psig or 366 degrees F, and all water piping over 160 psig, any other piping where B31.1 is required. All other piping shall be welded in accordance with ASME B31.9 unless otherwise stated. Changes in direction of piping shall be made with welding fittings only; mitering or notching pipe to form elbows and tees or other similar type construction will not be acceptable. Branch connections may be made with either welding tees or forged branch outlet fittings, either being acceptable without size limitation. Branch outlet fittings, where used, shall be forged, flared for improvement flow where attached to the run, reinforced against external strains, and designed to withstand full pipe bursting strength.

a. Beveling: Field and shop bevels shall be in accordance with the recognized standards and shall be done by mechanical means or flame cutting. Where beveling is done by flame cutting, surfaces shall be cleaned of scale and oxidation before welding.

b. Alignment: Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Height shall be so aligned that no part of the pipe wall is offset by more than 20 percent of the wall thickness. Flanges and branches shall be set true. This alignment shall be preserved during the welding operation. If tack welds are used, welds shall be of the same quality and made by the same procedure as the completed weld; otherwise, tack welds shall be removed during the final welding operation.

c. Erection: Where the temperature of the component parts being welded reaches 32 degrees F or lower, the material shall be heated to within 100 degrees F of the system's maximum design temperature for a distance of 3 feet on each side of the weld before welding, and the weld shall be finished before the materials cool to within 200 degrees F of the maximum design temperature.

d. Defective Welding: Defective welds shall be removed and replaced. Repairing of defective welds shall be in accordance with the applicable standard: ASME B31.9 or B31.1.

e. Electrodes: After filler metal has been removed from its original package it shall be protected or stored so that its characteristics or welding properties are not affected. Electrode material shall be as required for the pipe material. Electrodes that have been wetted or that have lost any of their coating shall not be used.

5. Flanges and unions shall be faced true, and made square and tight. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16 inch thickness, full-face or self-centering flat ring type. The Gaskets shall be rated for the maximum pressure with at least a 100 psi safety factor and for the maximum temperature with a 50 degree F safety factor. contain aramid fibers bonded with styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR). Union or flange joints shall be provided in each line immediately preceding the connection to each piece of equipment or material requiring maintenance such as coils, control valves, and other similar items.

6. Threaded joints can be used in systems that will not exceed 450 degrees F and shall be made with tapered threads properly cut and shall be made perfectly tight with a 500 degree F rated non-hardening, non-toxic, self-lubricating, heavy duty pipe thread paste equal to TFT™ Pipe Thread Sealant w/PFTE (as manufactured by Anti-Seize Technology) applied to the male threads only, and in no case to the fittings.

3.04 CONNECTIONS TO EQUIPMENT

A. Supply and return connections shall be provided by the Contractor unless otherwise indicated. Valves and traps shall be installed in accordance with the manufacturer's recommendations. Unless otherwise indicated, the size of the supply and return pipes to each piece of equipment shall be not smaller than the connections on the equipment. No bushed connections shall be permitted. Change in sizes shall be made with reducers or increasers only.

3.05 SUPPORTS

A. Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. All piping subjected to vertical movement when operating temperatures exceed ambient temperatures, shall be supported by variable spring hangers and supports or by constant support hangers.

B. Piping and attached valves shall be supported and braced to resist seismic loads as specified under the SEISMIC PROTECTION FOR MECHANICAL, ELECTRICAL EQUIPMENT section. Structural steel required for reinforcement to properly support piping, headers, and equipment, but not shown, shall be provided under this section. Material used for supports shall be as specified under the STRUCTURAL STEEL section.

1. Structural steel brackets required to support piping, headers, and equipment, but not shown, shall be provided under this section. Material and installation shall be as specified under the STRUCTURAL STEEL section. Pipe hanger loads suspended from steel joist panel points shall not exceed 50 pounds. Loads exceeding 50 pounds shall be suspended from panel points.

2. Multiple pipe runs on a common base member shall be supported by clamps where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for any individual pipe in the multiple pipe run.

C. Pipe hangers, inserts and supports shall conform to MSS SP-58 and MSS SP-69, except as specified as follows:

1. Types 5, 12, and 26 shall not be used.

2. Type 3 shall not be used on insulated pipe which has a vapor barrier. Type 3 may be used on insulated pipe that does not have a vapor barrier if clamped directly to the pipe and if the clamp bottom does not extend through the insulation and the top clamp attachment does not contact the insulation during pipe movement.

3. Type 18 inserts shall be secured to concrete forms before concrete is placed. Continuous inserts which allow more adjustment may be used if they otherwise meet the requirements for Type 18 inserts.

4. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and have both locknuts and retaining devices, furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.

5. Type 20 attachments used on angles and channels shall be furnished with an added malleable iron heel plate or adapter.

6. Type 24 may be used only on trapeze hanger systems or on fabricated frames.

7. Where Type 39 saddle or Type 40 shield are permitted for a particular pipe attachment application, the Type 39 saddle shall be used on all pipe 4 inches and larger.

8. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves.

9. Vertical pipe shall be supported at each floor, except at slab-on-grade, and at intervals of not more than 15 feet, except that pipe shall be supported not more than 8 feet from end of risers, and at vent terminations.

10. Type 35 guides using steel, reinforced PTFE or graphite slides shall be provided where required to allow longitudinal pipe movement. Lateral restraints shall be provided as required. Slide materials shall be suitable for the system operating temperatures, atmospheric conditions and bearing loads encountered. Where steel slides do not require provision for restraint or lateral movement, an alternate guide method may be used. On piping 4 inches and larger, a Type 39 saddle may be welded to the pipe and freely rest on a steel plate. On piping under 4 inches, a Type 40 protection shield may be attached to the pipe or insulation and freely rest on a steel slide plate. Where there are high system temperatures and welding to piping is not desirable, then the Type 35 guide shall include a pipe cradle, welded to the guide structure and strapped securely to the pipe. The pipe shall be separated from the slide material by at least 4 inches, or by an amount adequate for the insulation, whichever is greater.

11. Except for Type 3, pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation.

D. Escutcheons shall be provided at all finished surfaces where exposed piping, bare or covered, passes through floors, walls, or ceilings, except in boiler, utility, or equipment rooms. Escutcheons shall be fastened securely to pipe sleeves or to extensions of sleeves without any part of sleeves being visible. Where sleeves project slightly from floors, special deep-type escutcheons shall be used. Escutcheons shall be chromium-plated iron or chromium-plated brass, either one-piece or split pattern, held in place by internal spring tension or setscrew.

3.06 STRAINERS

A. Provide a full size strainer on the inlet side of each pump and elsewhere as shown on the Drawings and details. Full pipe size (non-reducing) suction diffusers may be substituted for pump suction strainers.

B. Each strainer shall be provided with a full size blow down valve located 6-12" below the strainer. Blow down connection shall be as the low point of the strainer.

C. Horizontal strainers in steam piping shall be rotated horizontally to avoid having a low point where condensate can collect. If this is not practical, provide a removable steam trap assembly for the strainer’s blow down connection.

D. Strainer shall have stainless steel screens with maximum 1/8” perforations (for pumps). Minimum perforations shall be 3/32”.

3.07 GAUGES AND THERMOMETERS

A. Pressure Gauges

1. Provide at the following locations:

   a. At the discharge connection of each pump as well as the inlet and outlet of each pump suction diffuser or strainer.

   b. In addition to the above, as indicated on diagrams.

2. All gages shall be provided with isolation valves. Snubbers shall be provided on all pressure gauge connections.

3. Gauges on piping in the Mechanical Room shall be so placed as to be easily read from the floor without parallax.

B. Thermometers, Wells, and Pressure/Temperature Plugs

1. Provide, where shown on the Drawings and where specified herein. Thermometers located over 7 feet above floor shall be remote bulb type.

2. All thermometer wells shall be installed in such a manner that a minimum of restrictions will be caused to the flow in the pipes and so the thermometers can be easily read from the floor. For piping under 3", wells shall be installed at a 45° angle in the piping.

3.08 PIPE EXPANSION

A. The expansion of supply and return pipes shall be provided for by changes in the direction of the run of pipe, by expansion loops, or by expansion joints as indicated or as required.

1. Expansion Loops shall provide adequate expansion of the main straight runs of the system within the stress limits specified in ASME B31.1. The loops shall be cold-sprung only where indicated or required. Pipe guides shall be provided as indicated and as required.

a. Expansion loops in grooved piping systems shall utilize flexible couplings. Rigid couplings shall not be used. Hanging guidelines shall conform to either manufacturer's published suggested spacing guidelines; or the requirements of the pipe hanger of this specification; whichever is more stringent.

2. Joints of the type specified shall be used for steam and low temperature water systems and shall be installed where indicated. The joints shall provide for either single or double expansion of the connected pipes as indicated and for the traverse indicated. The joints shall be designed for a working temperature and pressure suitable for the application and in no case less than 125 psig. The joints shall be in accordance with applicable requirements of EJMA-01 and ASME B31.1. End connections shall be flanged or grooved. Anchor bases or support bases shall be provided as indicated or required. Initial setting shall be made in accordance with the manufacturer's recommendations to allow for ambient temperature at time of installation. Pipe alignment guides shall be installed as recommended by the joint manufacturer, but in any case shall be not more than 5 feet from expansion joint, except in lines 4 inches or smaller where guides shall be installed not more than 2 feet from the joint.

3.09 VALVES AND EQUIPMENT ACCESSORIES

A. Valves shall be of the type and construction specified for the service and installed at the locations shown or specified, and where required for the proper functioning of the system as directed. Valves shall be installed with their stems horizontal to or above the main body of the valve. Valves used with ferrous piping shall have threaded or flanged ends and threaded or sweat-type connections for copper tubing. Non-flanged valves shall have unions for ease of maintenance.

B. Gravity flow-control (check) valves to control the flow of water shall be installed where specified or indicated on the drawings. The valve shall operate to prevent reverse flow and so that when the circulating pump starts, the increased pressure within the main will open the valve; when the pump stops, the valve will close. The valve shall be constructed with a cast iron body and shall be provided with a device whereby the valve can be

opened manually to allow gravity circulation. The flow-control valve shall be designed for the intended purpose, and shall be installed as recommended by the manufacturer.

C. Relief valves shall be installed where specified or indicated on drawings.

D. All branches from main piping (including mains that serve different wings or buildings) shall be provided with isolation valves.

E. Air vents shall be installed where indicated, and on all high points and piping offsets where air can collect or pocket.

1. Water air vents shall be high capacity type, automatic or manual, as specified and shown on drawings. For glycol systems, discharge shall be piped for gravity flow into a funnel to glycol fill tank.

2. Steam air vents shall be a quick-acting thermostatic valve that continuously removes air. Valve shall be constructed of corrosion-resisting metal, and be designed to withstand the maximum piping system pressure, and shall automatically close tight to prevent escape of steam and condensate. Vent shall be provided with a manual isolation valve. A vent shall be provided at all locations shown on drawings.

3.10 GAS FIRED HEATING SYSTEMS INSTALLATION

A. Equipment shall be installed as indicated and in accordance with the recommendations of the equipment manufacturer and the listing agency, except as otherwise specified. Combustion air supply and ventilation shall be in accordance with NFPA 54.

B. Vent dampers, piping and structural penetrations shall be located as indicated. Vent damper installation shall conform to ANSI Z21.66. Vent pipes, where not connected to a masonry chimney conforming to NFPA 211, shall extend through the roof or an outside wall and shall terminate, in compliance with NFPA 54. Vents passing through waterproof membranes shall be provided with the necessary flashings to obtain waterproof installations.

C. Gas piping shall be connected as indicated and shall comply with the applicable requirements at Section 220001 PLUMBING.

D. Foundations, settings, or suspensions for mounting equipment and accessories including supports, vibration isolators, stands, guides, anchors, clamps, and brackets shall be provided. Foundations and suspension for equipment shall conform to the recommendations of the manufacturer, unless otherwise indicated on drawings. Suspended equipment shall be independently supported from the building structure and not from suspended ceiling systems. Anchor bolts and sleeves shall be set accurately using properly constructed templates. Anchor bolts, when embedded in concrete, shall be provided with welded-on plates on the head end and guarded against damage until equipment is installed. Equipment bases shall be leveled, using jacks or steel wedges, and when resting on concrete shall be neatly grouted in with a nonshrinking type of grout. Equipment shall be located as indicated and in such a manner that working space is available for all necessary servicing, such as shaft removal, replacing, or adjusting drives, motors, or shaft seals, air filters, access to automatic controls, and lubrication. Electrical isolation shall be provided between dissimilar metals for the purpose of minimizing galvanic corrosion. The interior of cabinets or casings shall be cleaned before completion of installation.

3.11 HYDROSTATIC TESTS

A. Prior to flushing and cleaning and before the application of any insulation, hydrostatic tests shall be made in accordance with applicable ASME requirements. Coordinate with Owner's Representative for witnessing of tests. Test reports shall be submitted to the Engineer and Owner's Representative The systems shall be proved tight for four (4) hour tests (with no loss in pressure) under gauge pressures of 1-1/2 times the working pressure specified, but not less than the following:

1. Water piping (including pumped steam condensate) 150 psi

2. Low-pressure steam and condensate lines 50 psi

B. Retesting: If any deficiencies are revealed during test, such deficiencies shall be corrected and the tests reconducted at no additional costs to the Owner.

3.12 PIPING SYSTEM, CLEANING AND FLUSHING

A. Supply all materials, labor and power required for cleaning and flushing. Cleaning shall be started only after all piping has been successfully hydrostatically tested and all systems have been completely connected up.

B. Piping Cleaning and Flushing

1. Exercise every precaution to avoid introducing foreign matter such as welding beads and slag or dirt into the piping system. All completed welds shall be hammered to loosen debris. All piping, valves and fittings shall be internally cleaned of oil, grease or dirt, prior to assembly into system by use of wire brush and swab.

2. All cleaning and flushing work shall be coordinated with and supervised by the Water Treatment Sub Subcontractor for chemicals and procedures to be followed. See the Water Treatment Section of these Specifications.

3. Following the successful testing of the piping systems, they shall be cleaned under the supervision of the Water Treatment Sub Subcontractor.

4. Before submitting piping systems for acceptance, all strainers shall be inspected and thoroughly cleaned.

5. Cleaning shall be started only after all piping has been hydrostatically tested and all systems have been completely connected up.

6. Operate pumps or provide other means of circulating water throughout system for period of 8 hours. At the end of circulation, remove and clean all strainer baskets and blow off all low points.

3.13 BOILER/BURNER EFFICIENCY AND OPERATING TESTS

A. Upon completion, and before acceptance of the work, each boiler shall be subjected to such operating tests as may be required to demonstrate satisfactory functional operation. Each operating test shall be conducted at such times as the Owner's Representative may direct. Instruments, test equipment, and test personnel required to properly conduct all tests shall be provided by the Contractor and the necessary fuel, water, and electricity will be furnished by the Owner. The boiler operating tests for each modulating or staged boiler shall, as a minimum, be conducted continuously at the following capacities for the following times:

Time Capacity

First hour	25% (or minimum)
Next hour	50%
Next hour	75%
Next 2 hours	100%

B. The general performance tests on the heating plant shall be conducted by an experienced test engineer and will be observed by the Owner's Representative. A test report including logs, tabulated results, and conclusions shall be submitted to the engineer and the Owner's Representative.

C. Steam boilers and associated piping shall be inspected by a boiler inspector qualified as required by ASME BPV VIII Div 1, ASME BPV I, or ASME BPV IV, as applicable. A certificate of approval shall be supplied for each boiler.

D. Retesting if any deficiencies are revealed during test, such deficiencies shall be corrected and the tests reconducted at no additional costs to the Owner.

3.14 DUCTWORK

A. Installation shall be according to the standards referenced in PART 2 for the system. Duct supports for sheet metal ductwork shall be according to THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS, 2ND ED., 1995, unless otherwise specified. Friction beam clamps indicated in THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS, 2ND ED., 1995 shall not be used.

B. Dust Control: To prevent the accumulation of dust, debris and foreign material during construction, temporary dust control protection shall be provided. The combustion air system shall be protected with temporary seal-offs at all inlets and outlets at the end of each day's work. Temporary protection shall remain in place until system is ready for startup.

3.15 BASES AND SUPPORTS

A. In addition to supports and hangers as mentioned in the MISCELLANEOUS METALS section, provide all bases and supports not part of the building structure, of required size, type, and strength, as approved by the Engineer, for all equipment and materials furnished by him. All equipment, bases and supports shall be adequately anchored to the building structure to prevent shifting of position under operating conditions.

B. All concrete foundations and all concrete supports will be provided by the General Contractor. The HVAC Subcontractor shall furnish shop drawings and templates for all concrete foundations and supports for setting all required hanger and foundation bolts and other appurtenances necessary for the proper installation of his equipment. All concrete work shall be shown in detail on the shop drawings prepared by the HVAC Subcontractor, and be submitted to the Architect, showing the complete details of all foundations, including the necessary concrete and steel work and vibration isolation devices.

C. All floor-mounted equipment shall be erected on concrete pads over the complete floor area of the equipment, unless specified to the contrary herein.

3.16 MISCELLANEOUS IRON AND STEEL

A. All work shall be cut, assembled, welded and finished by skilled mechanics. Welds shall be ground smooth. Stands, brackets, and framework shall be properly sized and firmly constructed.

B. Measurements shall be taken on the job and worked out to suit adjoining and connecting work. All work shall be by experienced metal working mechanics. Members shall be straight and true and accurately fitted. Scale, rust, and burrs shall be removed. Welded joints shall be ground smooth where exposed. Drilling, cutting and fitting shall be done as required to properly install the work and accommodate the work of other trades as directed by them.

C. Members shall be generally welded, except that bolting may be used for field assembly where welding would be impractical.

D. All shop fabricated iron and steel work shall be cleaned and dried and given a shop coat of paint on all surfaces and in all openings and crevices.

3.17 PLACING IN SERVICE

A. At the completion of performance tests and following approval of test result, recheck all equipment to see that each item is adequately lubricated and functioning correctly.

B. Furnish upon completion of all work, certificates of inspections from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating conditions.

3.18 CLEANING AND ADJUSTING

A. During the progress of the work, clean up and remove all oil, grease, and other debris caused by the work performed under this Section.

B. At the conclusion of the project, clean and repair all areas and finishes as installed or affected by this installation of work under this Section.

C. Strainers and valves shall be thoroughly cleaned. Prior to testing and balancing, air shall be removed from all water systems by operating the air vents. Temporary measures, such as piping the overflow from vents to a collecting vessel shall be taken to avoid water damage during the venting process. Air vents shall be plugged or capped after the system has been vented.

D. Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction, and new filters shall be installed after all construction dirt has been removed from the building. System shall be maintained in this clean condition until final acceptance. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension.

3.19 OPERATING AND MAINTENANCE INSTRUCTIONS

A. All operating equipment installed under this section shall be placed in operation and shall function continuously in an operating test for a period of one week without shutdown due to mechanical failure or necessity of adjustment. Prior to scheduling the Project Final Inspection and after completion of all installation and running adjustments, the HVAC Subcontractor shall perform all work required to place the equipment in complete operating condition to meet all requirements under this Specification.

B. During this running test period, the HVAC Subcontractor shall deliver to the designated representative of the Owner, six complete sets of operating, service and replacement data for all equipment which will require operating maintenance or replacement and one copy of this literature shall be available during the instruction of the operating personnel while the other is checked for completeness by the Engineer.

3.20 TRAINING

A. Conduct a training course for the maintenance and operating staff. The training shall start after the system is functionally complete but before the final acceptance tests. The training shall include all of the items contained in the operating and maintenance instructions as well as demonstrations of routine maintenance operations. The Owner's Representative shall be given at least two weeks advance notice of such training.

B. During all working hours of the one week operating test, the HVAC Subcontractor's instruction personnel shall be available for and provide thorough and detailed training to the Owner's operating and maintenance personnel in operation, maintenance and adjustment of all equipment installed. The instructions shall be videotaped by the Subcontractor. The master tape and one (1) copy shall be turned over to the Owner not more than 10 days following the completion of the training.

C. Give sufficient notice to the designated operating personnel of the Owner in advance of this period. Upon completion of instruction, obtain from such representatives written verification on that which the above mentioned instruction has been performed, such verification to be forwarded to the Architect.

D. Provide instruction time of 40 hours for systems and an additional 40 hours for ATC.

END OF SECTION

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SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The GENERAL REQUIREMENTS, DIVISION 01, and BIDDING AND CONTRACT REQUIREMENTS, DIVISION 00, are hereby made a part of this Specification Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

A. Work includes the removal of fourteen (14) existing cast iron steam boilers, boiler feed system and piping. New work includes the installation of three (3) new vertical steel gas fired steam boiler and replacement of existing header and valves, new boiler feed system and reconnection of gas piping and breeching.

B. Refer to the specific requirements for this project included in the “Narrative Report for Compliance with the Fire Protection and Life Safety Systems Section of the Massachusetts State Building Code (780CMR) – Fire Protection Construction Documents”, which shall be considered part of these specifications. Include all associated testing and certifications necessary for compliance and any required remedial actions and retest due to failure.

C. The building is to be commissioned and Contractor shall provide all labor required to fully test and demonstrate that all systems operate as designed.

D. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:

1. Identification
2. Raceways and Conduit
3. Wire and Cable (600V)
4. Wiring Devices and Plates
5. Outlet Boxes
6. Junction Boxes, Pull Boxes and Wireways
7. Safety Disconnect Switches
8. Panelboards
9. Motor Starters
10. Sleeving
11. Fire Seal and Fireproof Sealant
12. Supervision and Approval
13. Electrical Connections to HVAC and Plumbing Equipment, and other Equipment provided under other Sections or by Owner.
14. Relocation of existing electrical components that interfere with new construction and removal and disposal of obsolete components.
15. Short Circuit Protection and Coordination Study

16. Testing
17. Operating and maintenance instructions and manuals
18. Coordination drawings
19. Shop drawings
20. Record (as-built) drawings

E. Work of this Section is generally shown on the Electrical Drawings.

1.3 RELATED WORK

A. Principal classes of Work related to the Work of this Section are listed in the Specification Table of Contents, and are specified to be performed under the indicated Sections of the Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. It is the responsibility of the Contractor to coordinate and schedule the Work of this Section with that of all other trades.

B. The following work is not included in this section and will be provided under other sections:

1. Furnishing and installation of motors.
2. Structural supports necessary to distribute loading from equipment to roof or floor except as specified.
3. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing. Refer to Division 01, General Conditions.
4. Flashing of roof and wall penetrations.
5. Painting, except as specified herein.

1.4 DEFINITIONS

A. As used in this Section, the following items are understood to have the following meaning:

1. "**Contractor or Subcontractor** ", unless otherwise qualified, shall mean the installer of the work specified under this Section.
2. **"Furnish"** shall mean purchase and deliver to the project site, complete with every necessary appurtenance.
3. **"Install"** shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.
4. **"Provide"** shall mean "Furnish" and "Install".
5. **"Work"** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.
6. **"Concealed"** shall mean hidden from sight in chases, furred-in spaces, shafts, hung ceilings, embedded in construction or in a crawl space. Areas to be concealed as part of tenant alterations to the building shall also be considered in this definition.
7. **"Exposed"** shall mean not installed underground or concealed as defined above.
8. **"Furnished by Others"** shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.

9. **"Owners Representative"** shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.
10. **"Date of Substantial Completion"** shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy purposes. The GENERAL REQUIREMENTS, DIVISION 01, shall supersede this definition where specifically defined.

1.5 CODES, REFERENCES AND PERMITS

A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with the Department of Public Safety, Department of Environmental Protection, State Building Code and any other Codes and Regulations having jurisdiction including but not limited to:

1. All Applicable NFPA Standards
2. National Electrical Code (NEC)
3. Occupational Safety and Health Administration (OSHA)
4. State and Local Building Codes
5. Underwriters' Laboratories, Inc. (UL)

B. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:

1. American National Standards Institute (ANSI)
2. American Society of Mechanical Engineers (ASME)
3. American Society of Testing and Materials (ASTM)
4. Certified Ballast Manufacturers (CME)
5. Illuminating Engineering Society (IES)
6. Institute of Electrical and Electronics Engineers (IEEE)
7. Insulated Cable Engineers Association (ICEA)
8. National Electrical Contractors Association (NECA)
9. National Electric Manufacturers Association (NEMA)
10. Thermal Insulation Manufacturers Association (TIMA)

C. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.

D. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner's Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner's Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.6 GENERAL REQUIREMENTS

A. Nameplates

1. Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the equipment.

B. Equipment Guards

1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

1.7 MATERIAL AND EQUIPMENT STANDARDS

A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner's Representative.

B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process. The Contractor shall highlight and list all applicable specification requirements which the substituted material deviates from.

C. If a substitution of materials or equipment in whole or in part is made, this Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.

D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

1.8 SUBMITTALS

A. Conform to the requirements of Division 01, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractor s and shall note the name(s), license number(s) and license expiration date(s) of the Contractor (s) installing electrical systems.

B. Definitions:

1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.
2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications, certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:

a. Meet all performance criteria listed in the schedules and outlined in the specifications. For example, to be acceptable, an emergency generator must deliver equal kW / kVA at equal or greater efficiency using equal or less fuel as the emergency generator listed in the schedules.
b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will fit within the available space – this determination is solely the responsibility of the Contractor.
c. Products must adhere to all architectural considerations including, but not limited to; being of the same color as the product scheduled or specified, fitting within the architectural enclosures and details, and for lighting – being the same size and of the same physical appearance as scheduled or specified products.

C. Submittal Procedures, Format and Requirements

1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.
2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:

    a. Title
    b. Equipment number
    c. Name and location of project
    d. Names of Owner, Engineer and Seller
    e. Names of manufacturers, suppliers, vendors, etc.
    f. Date of submittal
    g. Whether original submittal or resubmitted

3. Shop Drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum ¼" – 1' scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary.
4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.
5. Provide Shop Drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.
6. Provide complete data for all auxiliary services and utilities required by submitted equipment. This shall include fuel, cooling and exhaust requirements and points of connections.
7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control

diagrams, termination diagrams, and all control interfaces with a central control system.

8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.
9. The Owner's Representative shall approve all materials before commitment for materials is made.

D. Specifications and Schedule Compliance Statement

1. The manufacturer shall submit a point by point statement of compliance with each specification criteria listed in each paragraph for those submittals listed in Paragraph E: Product Data that are noted with an asterisk (*).
2. The statement of compliance shall consist of a list of all paragraphs (line by line) identified in Part 2 and applicable Part 3 of the specification for which the submitted product in the opinion of the manufacturer complies, deviates, or does not meet.
3. Where the proposed submittal complies fully, the word "comply" shall be placed opposite the paragraph number.
4. Where the proposed submittal does not comply, or accomplishes the stated function in a manner different from that described, a full description of the deviation shall be provided.
5. Verify each field of the associated schedule where associated technical data is presented on the drawings. Where the submitted material does not 'comply" provide the value the submitted equipment will achieve based upon the specified conditions.
6. Where a full description of a deviation is not provided, it shall be assumed that the proposed system does not comply with the paragraph in question and the product will be rejected.
7. Submissions which do not include a point by point statement of compliance as specified shall be disapproved.

E. Product Data: Submit complete manufacturer's product description and technical information including:

1. Identification
2. Raceways and Conduit
3. Wire and Cable (600V)
4. Wiring Devices and Plates
5. Outlet Boxes
6. Junction Boxes, Pull Boxes and Wireways
7. Safety Disconnect Switches
8. Panelboards
9. Light Fixtures
10. Motor Starters
11. Fire Seal and Fireproof Sealant
12. Seismic Restraints
13. Identification, labels and tags.
14. O&M table of contents

F. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

1. Do not submit multiple product information in a single bound manual.
2. Three-ring binders shall not be accepted.

G. Deviations:

1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.
2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.
3. Approval of proposed deviations, if any, will be made at discretion of Engineer.

H. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required for the following:

1. Coordination drawings.
2. If more than five shop drawings of a single trade are received in one calendar week.

I. Responsibility

1. Intent of Submittal review is to check for capacity, rating, and certain construction features. The Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the Contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.
2. Inform Contractor, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.

J. In the event that the Contractor fails to provide Shop Drawings for any of the products specified herein:

1. The Contractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.
2. If the Contractor furnishes and installs material and/or equipment that is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment. He shall also be responsible for the replacement of this material and/or equipment with material and/or equipment that is in complete accordance with these Specifications, at the direction of the Owner's Representative.
3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.

4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.

K. Mark dimensions and values in units to match those specified.

L. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.9 OPERATION AND MAINTENANCE DATA

A. Commence preparation of the Operating and Maintenance (O&M) manuals immediately upon receipt of "Approved" or "Approved as Noted" shop drawings and submit each section within one month. The final submission shall be no later than two months prior to the projected date of Substantial Completion of the Project.

B. Each O&M document shall include the manufacturer's web address for equipment specific O&M information for Internet access by the Owner.

C. The manual shall consist of three (3) sets of manuals and include three (3) sets of CDs, which shall contain the scanned content of the entire manual. The manual shall highlight the actual equipment used and not be a master catalog of all similar products of the manufacturer. The manual shall be submitted for review prior to creation of the CDs.

D. The Manual shall contain the following:

1. Operations Manual

   a. Systems description including all relevant information needed for day-to-day operations and management including start-up and shut-down instructions.
   b. Wiring diagrams, schematics, logic diagrams and sequence of operations that accurately depict the controls system.
   c. Depiction of each interface screen where programmable logic and visual displays are provided. Descriptors shall be provided to define displayed data, alarms, etc.
   d. A single sheet (for ease of removal) of all access codes and passwords necessary to access all levels of control and programming.
   e. Trouble shooting guide defining common alarms/problems with possible cause and effect.

2. Maintenance Manual

   a. Define all maintenance activities required to ensure system operation within manufacturers specified parameters. Provide table of all required activities plotted vs. interval with adequate fill-in-space for "activity completion date" and "comments". Where multiple instrument readings are required, provide data sheet formatted to accommodate activity.
   b. Define recommended spare parts inventory with part numbers and source defined for ordering by the Owner. Identify lead time on all parts, source location and cost.
   c. Provide copy of all warranty information with associated date of substantial completion (commencement of warranty) and end date of coverage. Define all components/subsystems specifically included and excluded.

3. Provide O&M manuals for each of the following:

a. Motor Starters

1.10 RECORD DRAWINGS

A. Refer to DIVISION 01, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.

B. Record Drawings (red-line drawings) will be updated by this Contractor daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as completed, including dimensions (vertical/horizontal) of concealed components off fixed building elements.

C. The Electrical Foreman shall maintain complete and separate set of prints of Contract Drawings at job site at all times and shall record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.

D. At completion of work the Electrical Contractor shall prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The Architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. The Electrical Contractor shall transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CADD layering as established by the A&E design team shall be maintained with any and all changes done by the Contractor.

E. The Engineer is not granting to the Contractor any ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Architect and Engineer are granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Architect and Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Architect and Engineer harmless from all loses, claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.

F. Record Drawings, shall show "as-built" condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and model numbers of final equipment installation.

G. The Electrical Contractor shall submit the record set for approval by the engineer a minimum of four weeks prior to seeking the permanent certificate of occupancy.

1.11 WARRANTIES

A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all

liabilities which the manufacturer and the Electrical Contractor may have by law or by provisions of the Contract Documents.

B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one-year (1) commencing with the Date of Substantial Completion. Where individual equipment sections specify longer warranties, provide the longer warranty. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.

C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.

D. Upon receipt of notice from the Owner of the failure of any part of the systems during the warranty period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.12 COORDINATION

A. Refer to Division 01, General Conditions, for coordination requirements applicable to this section, unless specifically noted otherwise in this section.

B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.

C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner’s Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner’s Representative's satisfaction at no expense to the Owner.

D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, conduit, cable, sleeves, etc., and give information in advance to allow construction of required openings. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the General Contractor for the proper setting of same.

F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.

G. Make reasonable modifications in the work as required by structural interferences, or by interference with work of other trades, or for proper execution of the work without extra charge.

1.13 COORDINATION DRAWINGS

A. Provide a set of Electrical coordination drawings for use in verifying required code clearances of all electrical equipment and for use in coordinating installation of equipment with other trades. Where practical, the CADD layering as established by the A&E team for the construction documents, shall be utilized in the preparation of all coordination drawings. Where CADD layering deviates from the A&E team's layering convention, submit the proposed layering system for approval. The CADD layering used shall provide, as a minimum, the flexibility of illustrating trade specific items similar to the established A&E team layering standard.

B. The intent of the coordination drawings is to identify and resolve installation conflicts prior to fabrication and installation of any MEP trade.

C. The HVAC Contractor's floor plans shall be the basis for floor plan coordination. The Electrical Contractor's reflected ceiling plans shall be the basis for reflected ceiling plan coordination. All other trades shall provide the HVAC / Electrical Contractors with their Drawings / Layers for incorporation into one set of coordinated multi-trade drawings.

D. The CADD Drawings prepared by the Architect and Engineer contain representations of certain elements of the Project, and are not necessarily complete, nor are the CADD Drawings comparable or identical to final construction drawings. The Architect and Engineer make no representations or warranties with respect to the accuracy or completeness of the CADD Drawings. The Architect and Engineer do not recommend that the Contractor use the CADD Drawings in connection with the preparation of shop drawings. Should the Contractor choose to do so, however, the Contractor shall carefully review and compare the CADD Drawings with the corresponding final construction drawings to verify their accuracy and identify all discrepancies, differences, and inconsistencies in design, locations, dimensions, scope, and all other respects between the CADD Drawings and the corresponding final construction drawings. The Contractor, shall base the preparation and submission of shop drawings, and in general, shall base the performance of all its obligations with respect to the Project upon the information contained in the final construction drawings and not the CADD drawings. Nothing shall be construed as to relieve the Contractor of any of its obligations (such as, by way of illustration, the obligation to make field measurements or to coordinate drawings) under its contract with respect to the Project.

E. Electrical Coordination Drawings shall be prepared as outlined below.

1. Prepare Electrical Coordination Drawings showing all Electrical work to be installed as part of Section 26 00 00. The Coordination Drawings shall be created using AutoCAD and shall have a scale of ¼" or 3/8".
2. The Electrical Coordination Drawings shall show distribution equipment (switchboards, panelboards, transformers, motor control centers, etc), feeders, light fixtures, cable tray and conduit racks. Drawings shall include dimensions and elevation tags for all equipment, devices and material.
3. After incorporating all trades, resolve any areas of conflicts between trades under the direction of the General Contractor / Construction Manager and submit fully coordinated drawings to the Owner's Representative.

4. Do not install any of this work prior to the preparation and Engineer's review of the final Coordination Drawings. If Electrical work proceeds prior to the final Coordination Drawings, any change to the Electrical work to correct the interferences and conflicts which result will be made by this Contractor at no additional cost to the Owner.
5. Coordination Drawings are for this Contractor's and Owner's Representative's use during construction and shall not be construed as replacing any shop, "as-built", or Record Drawings required elsewhere in these Contract Documents.
6. Owner's Representative's review of Coordination Drawings shall not relieve this Contractor from his overall responsibility for coordination of all work performed pursuant to the Contract or from any other requirements of the Contract.

1.14 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice-versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by this Contractor without additional expense to the Owner.

B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the project and shall have the approval of the Owner's Representative before being installed. This Contractor shall follow Drawings, including his shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Owner's Representative before proceeding with the installation. This Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of Contractor's proposed solution.

D. Size of conduits, cable trays, raceways and methods of running them are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the true intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge. All work shall be installed in an approved workmanlike manner.

1.15 INSPECTION OF SITE CONDITIONS

A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed and send a report, in writing, to the Owner's Representative, noting any conditions which might adversely affect the Work of this Section of the Specifications.

1.16 SURVEY AND MEASUREMENTS

A. Base all required measurements, horizontal and vertical, from referenced points established WITH the Owner's Representative. The Electrical Contractor shall be responsible for correctly laying out the Work required under this Section of the Specifications.

B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.17 DELIVERY, STORAGE AND HANDLING

A. No materials shall be delivered or stored on site until corresponding Shop Drawings have been approved.

B. All manufactured materials shall be delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.

C. Protect materials against dampness. Store off floors, under cover and adequately protected from damage.

D. Inspect all equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.18 PROTECTION OF WORK AND PROPERTY

A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.

B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.

C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.

D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.19 SUPERVISION

A. Supply the service of a competent Supervisor with a minimum of 5 years experience in Electrical construction supervision who shall be in charge of the Electrical work at the site.

1.20 SAFETY PRECAUTIONS

A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.

B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and/or property.

1.21 SCHEDULE

A. Construct work in sequence under provisions of Division 01 and as coordinated with the Owner's Representative.

1.22 HOISTING, SCAFFOLDING AND PLANKING

A. The work to be done under this Section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, helicopters, scaffolds, staging and planking as required for the work.

1.23 CUTTING AND PATCHING

A. Include all coring, cutting, patching, and fireproofing necessary for the execution of the work of this Section. Structural elements shall not be cut without written approval of the Architect. This Contractor shall be responsible for taking all precautions required to identify hidden piping, conduits, etc. before any core drilling and/or cutting of slabs commences, including X-raying the affected slabs. Provide fire stopping to maintain the fire rating of the fire resistance-rated assembly. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details and be listed by UL or FM.

B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.

C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and shape and consult with the Owner's Representative and all other trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.

D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.

E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment which is part of this Section of the Specifications.

F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.

G. Any cost caused by defective or ill-timed work required by this Section of the specifications shall be borne by this Contractor.

H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.24 SLEEVES, INSERTS AND ANCHOR BOLTS

A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this section of the specifications.

B. All pipes passing through floors, walls, ceilings or partitions shall be provided with fire stopping to maintain the fire rating of the structure. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details. Provide sleeves for all penetrations where required by the listed detail, for the penetration of all mechanical room floors and where specifically required on the drawings.

C. Field drilling (core drilling), when required, shall be performed under this section of the specifications, after receipt of approval by the Owner's Representative.

1. When coring cannot be avoided, provide ¼ inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below and protect and piping, ductwork, wiring, furniture, personnel, etc., below the location of the core.

1.25 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

A. Provide all supplementary steel, factory fabricated channels and supports required for the proper installation, mounting and support of all Electrical equipment, piping, etc., required by the Specifications.

B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative as shown on the drawings or herein specified.

C. The type and size of the supporting channels and supplementary steel shall be determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.

D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

E. All supplementary steel including factory fabricated channels, supports and fittings shall be galvanized steel, aluminum or stainless steel where exposed or subject to rust producing atmosphere. Factory fabricated channels shall be manufactured by Unistrut, H-strut, Powerstrut or approved equal.

1.26 HAZARDOUS MATERIALS

A. Removed batteries shall be recycled by a facility approved by the Owner's Representative. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment.

B. Removed fluorescent and HID lamps shall be recycled by a facility approved by the Owner's Representative. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment.

C. All ballasts in lighting fixtures to be disposed shall be verified to be PCB free. All ballasts manufactured prior to 1979 and not labeled as PCB free shall be considered to contain PCB's. Provide written verification to the Owner's Representative that confirms PCB free waste. Where PCB free waste cannot be verified, ballasts shall be recycled by a facility approved by the Owner's Representative, with PCB components eliminated by a high temperature incineration. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment. All handling shall conform to EPA requirements. Provide breakout cost for this scope.

D. Where it has been identified that asbestos-containing material exists within the scope limits, refer to the Asbestos Abatement specification section for requirements.

1.27 ACCESSIBILITY

A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.28 SEISMIC RESTRAINT REQUIREMENTS

A. Submit working plans and calculations reviewed, signed and stamped by a professional engineer who is registered in the State where the project is located and has specific experience in seismic calculations, certifying that the plans meet all seismic requirements established by authorities having jurisdiction over the project.

B. For each seismic restraint, provide certified calculations to verify adequacy to meet the following design requirements:

1. Ability to accommodate relative seismic displacements of supported item between points of support.
2. Ability to accommodate the required seismic forces.

C. For each respective set of anchor bolts provide calculations to verify adequacy to meet combined seismic-induced sheer and tension forces.

D. For each weldment between structure and item subject to seismic force, provide calculations to verify adequacy.

E. Restraints shall maintain the restrained item in a captive position without short circuiting the vibration isolation.

1.29 PROJECT CLOSEOUT

A. Certificates Of Approval

1. Upon completion of all work, provide certificates of inspections from the following equipment manufacturers stating that the authorized factory representatives have inspected and tested the operation of their respective equipment and found the equipment to be in satisfactory operating condition and installed per the manufacturers installation instructions and requirements.

B. Construction Observations By The Engineer

1. The engineer shall make progress site visits during construction and one substantial completion (punch list) site visit for determining substantial completion.
2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.
3. Progress Site Visits

   a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.
   b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.

C. Substantial Completion

1. When the Contractor considers the Work under this Section is substantially complete, the Contractor shall submit written notice, through the General Contractor, with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Architect and/or Owner and he will not make a substantial completion site visit.
2. The following items shall be completed prior to the written request for substantial completion site visit:

   a. Certification of successful operation of all systems.
   b. Training of the Owner's personnel in the operation of the systems.
   c. Record Drawings in accordance with the contract specifications.
   d. Operation and Maintenance manuals.
   e. Testing reports.
   f. Manufacturer's certificates of approvals.
   g. Emergency contact list for reporting of malfunctioning equipment during the warrantee period.
   h. Contractors Project Completion certificate.

3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.
4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list of the major

deficiencies and a reason for the work not being considered substantially complete.

5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.
6. The Contractor shall remedy all deficiencies listed in the punch list within the time frame required by the contract.

D. Engineers Construction Completion Certification

1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete.
2. There shall be NO outstanding items identified on the punch list for scope within any of these categories.

E. Final Completion

1. The following items shall be submitted prior to the written request for Final completion:
   a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.
   b. Warranties commencing the date of Substantial completion
   c. Individual Signed and dated Punch List acknowledging completion of all punch list items
2. When the Contractor considers all of the punch list work items complete, the Contractor shall submit written notice through the General Contractor that all Punch List items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Architect or Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.
3. If the work is not fully complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any reobservations by the engineer.

F. Re-observation Fees

1. The re-observation fee shall be $1200.00 per visit.

G. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK Engineers can furnish a blank Contractor's certificate form upon request. The certificate shall certify:
   a. Execution of all work has been in accordance with the approved construction documents.

b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.

2. The certificate shall include the following information:

a. Project.
b. Permit Number.
c. Location.
d. Construction Documents.
e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.
f. Addendum(a) and Revision Dates.

3. The certificate shall be signed by the Contractor and include the following:

a. Signature.
b. Date.
c. Company.
d. License Number.
e. License Expiration Date.

PART 2 - PRODUCTS

2.0 NOT USED

2.1 IDENTIFICATION

A. Nameplates

1. Nameplates shall be laminated black Bakelite with minimum 1/4" high white recessed letters.
2. Nameplates shall be securely attached to the equipment. Utilize mechanical fasteners such as galvanized steel or brass screws for exterior applications. High strength adhesives or cements may be used for interior applications.

2.2 RACEWAYS AND CONDUIT

A. Rigid Galvanized Steel (RGS) Conduit

1. RGS shall be zinc-coated steel that conforms to ANSI C80.1, UL Specification No. 6 and Federal Specification WW-C-581e by Allied Tube and Conduit, Republic Steel, Wheatland Tube or approved equal.
2. RGS fittings shall be threaded. Split couplings or non-threaded fittings shall not be used.
3. Nipples and Close Nipples shall be RGS, length as noted or as required to conform to field conditions.

B. Electrical Metallic Tubing (EMT)

1. EMT shall be zinc-coated steel that conforms to ANSI C80.3, UL Standard No. 797 and Federal Specification WW-C-563 a by Republic Steel, Allied Tube and Conduit or approved equal.
2. EMT fittings shall be zinc plated pressed steel set screw type that shall form a positive ground path.

C. Miscellaneous Conduit Fittings

1. Elbows shall be standard radius unless noted otherwise. Where Large Radius elbows are specified, provide 48" radius unless noted otherwise.
2. Bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C.
3. Bonding bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C with a lay-in tin plated copper grounding lug.
4. Exposed conduit expansion fittings shall be hot-dipped galvanized malleable iron with external bonding jumper equal to O.Z./Gedney Type EX for RGS or Type TX for EMT (4" maximum expansion).
5. Provide water-tight gland sealing assemblies with pressure bushings equal to OZ/Gedney Type WSK for new cast-in-place installations or Type CSCM for retrofit (core drilling of existing walls) as required for below grade wall and floor penetrations.

D. Flexible Metallic Conduit

1. Liquidtight Metal Conduit shall be UL Listed fabricated from a spiral wound strip of heavy gauge, corrosion resistant, hot dipped galvanized steel equal to Electri-flex Company Type LA. The jacket shall be flame retardant, sunlight resistant PVC extruded over the spiral wrap. Sizes through 1 ¼" shall have an integral copper bonding strip.
2. Liquidtight fittings shall be UL listed zinc plated insulated throat.
3. Flexible metal conduit shall be UL Listed non-jacketed steel fabricated from a spiral wound strip of heavy gauge, corrosion resistant, hot dipped galvanized steel equal to Electri-flex Company Type BR.

E. Wireways shall be minimum 16-gauge steel with all straight runs having hinged spring-latched covers. Finish shall be painted over a corrosion resistant phosphate pretreatment to protect against corrosion. Interior parts shall be smooth and free of sharp edges and burrs. Provide wireway as identified on the drawings for NEMA 1, 3R or 12 service. Wireways shall be equal to Square D and UL Listed.

2.3 WIRE AND CABLE (600V)

A. Provide single-conductor, annealed copper wire and cable with insulation rated for 600 V, of sizes specified and scheduled on Drawings, by General Electric, Southwire, Okonite or approved equal, for secondary service, feeders, branch and system wiring. Wire sizes shown and specified are American Wire Gauge for copper conductors.

B. The use of aluminum conductors is not allowed.

C. Wire #10 and larger shall be stranded; #12 and smaller shall be solid. Wire and cable shall have THWN-THHN or XHHW insulation for branch circuit and feeder conductors. Type RHWUSE shall be used for all conductors installed in below grade raceways for generator applications only.

D. Conductor Color-coding

1. Service entrance, branch circuit and feeder conductors shall be color-coded. Conductors #12 and #10 shall be colored with a factory applied solid or striped compound coating (black, red, blue, brown, orange or yellow). Neutrals and

equipment grounds shall have solid compound or solid color coating (white, gray and green), except that neutrals with colored stripe shall be used where required by code. Phase conductors #8 and larger with stripes, bands or hash marks shall have background color other than white, green and gray.

2. Alternative field-applied color coding methods may be used for wire #8 or larger, with color code as specified in other sections of this specification. Coloring shall be applied by the use of flame-retardant vinyl tape, equal to 3M Scotch 35.

Cable

1. Flexible Metal Clad (MC) cable shall be UL Listed with THHN insulated conductors with an insulated grounding conductor within galvanized steel or aluminum interlocked armor. Connectors shall be provided with lock nut connection to the termination point enclosure.
2. Flexible Metal Clad (MC) cable utilized for Fire Alarm service shall be identified with a factory applied tracer along the entire length.
3. Flexible Armored (AC) cable shall be UL Listed with THHN insulated conductors with an insulated grounding conductor within galvanized steel or aluminum interlocked armor with bare bond wire. Connectors shall be self-grommetted with lock nut connection to the termination point enclosure.

F. Splices and Terminations

1. Ampacity and temperature rating of splices and connectors shall be equal to or greater than those of associated wires and cables.
2. Make splices in branch circuit or feeder wiring from #12 to #10 with UL-listed, solderless screw on connectors rated 600 V.
3. Make splices in branch circuit or feeder wiring above #10 with UL-listed 90°C, 600V, compression butt splice barrel equal to Burndy YS-L HYLINK.
4. Conductor terminations shall be standard bolt-on lugs with hex screws listed for attachment of copper wire and cable to panelboards, switchboards, disconnect switches and other electrical equipment.
5. Make terminations for stranded conductors on screw terminals with UL Listed 105°C, 600V PVC insulated barrel compression locking fork tongue terminal equal to Burndy TP-LF VINYLUG.
6. Make bus terminations for conductors #6 and larger with UL-listed 90°C, 600V, compression standard barrel length lugs equal to Burndy YA-L for conductor sizes to #4/0. Connectors for cable 250 KCMil and larger shall be with UL-listed 90°C, 600V, compression long barrel length two hole lugs equal to Burndy YA-2N. Lugs shall be high conductivity seamless copper electro-tin plated for corrosion protection.

G. Wire management shall be provided by self-extinguishing self-locking nylon ties with -65 to 350°F. range for bundling conductors.

H. Cable pulling compounds shall be UL Listed and be suitable for use with the specified cable insulation system. The compound shall reduce the coefficient of friction, while not adding any long term issues to the installation such as premature aging of the insulation system, added flammability or drying in such a manner as to stick the cable in place in the raceway.

2.4 WIRING DEVICES AND PLATES

A. Provide wiring devices by single manufacturer. Catalog designations of Cooper are specified, unless noted otherwise, to establish standards of quality for materials and performance. Colors of devices as specified below are White for standard applications. Refer to the drawings for color requirements that vary from White. Equal products by Leviton, Pass & Seymour or Hubbell will be accepted. Provide published manufacturers cross-reference sheet highlighted with the device specified and that being submitted with all device product data for approval.

B. Wall switches shall be of the totally enclosed tumbler type. Wiring terminals shall be spring loaded terminal screws for back or side wiring. Switches shall be rated 20-ampere 277 volt for use on alternating current only. The yoke shall have a grounding terminal with a green hex head screw. Pilot lights indicated shall consist of red lighted handle, illuminated when the switch is on.

C. Toggle Switches shall be heavy duty, UL listed, specification grade as follows:

1. Single-pole shall be No. 2221W
2. Three-way shall be No. 2223W
3. Four-way shall be No. 2224W

D. Receptacles:

1. Receptacles shall be nylon faced with rigid, glass reinforced nylon bodies. Wiring terminals shall be spring loaded terminal screws for back or side wiring. Receptacles shall be rated 20-ampere 125 volt. The yoke shall have a grounding terminal with a green hex head screw.
2. Duplex receptacles shall be UL Federal Specification WC-596 Specification Grade Extra Hard Duty 125V, 20A, 2 pole, 3 wire as follows:

   a. GFCI Interior shall be No. GF20W (White)

3. Decorator duplex receptacles shall be provided only where specifically noted on the drawings. Devices shall be Specification Grade rated 20-ampere 125 volt equal to No. 6450W.

E. Wiring Device Plates:

1. Provide high-impact smooth nylon device plates by the manufacturer of the wiring device for all flush mounted switches and receptacles installed in dry locations and where not subjected to physical abuse. Fastening screws shall be color matched to the plate, plate color and to the device. Ganged plates shall be of one piece construction to accommodate the required number of installed devices. Oversized plates to cover wall finish blemishes adjacent to the device box shall not be used.
2. Receptacle device plates for other than 20 amp, 120 V, 2-wire, circuits shall be provided with typed clear plastic label (equal to P-Touch) mounted to the device plate indicating voltage characteristics, panelboard and circuit number of outlet

2.5 OUTLET BOXES

A. Outlet and switch boxes on concealed work shall be at least 4” square, galvanized pressed steel conforming to UL 514A. Where installed in plaster, boxes shall be fitted with galvanized steel plaster covers of required depth to finish flush with finished wall or ceiling. Outlet boxes shall be by Steel City Electric Company, Appleton Electric Company, or approved equal.

B. Outlet boxes installed in masonry walls or in concrete decking shall be UL Listed for the application.

C. Outlet boxes for interior surface mounted locations where RGS is specified where exposed to moisture, at kitchen and cafeteria equipment, adjacent to water or steam connections, and where indicated as weatherproof on Drawings shall be cast malleable iron with an aluminum polymer enamel coating equal to Appleton Type FD. Conduit entries shall be threaded cast hubs. Device covers shall be coated malleable iron with moisture sealing gasket and stainless steel fasteners.

D. Outlet boxes for exterior surface mounting shall be cast aluminum alloy with an aluminum polymer enamel coating equal to Appleton Type FD. Conduit entries shall be threaded cast hubs. Device covers shall be cast aluminum alloy with moisture sealing gasket and stainless steel fasteners.

E. All boxes shall have at least one tapped and threaded grounding hole for connection of a 10-32 grounding screw.

F. Box depth shall accommodate code required volume for the specified installation. Through wall boxes shall not be used.

G. Outlet boxes for various systems including but not limited to fire alarm, paging and master clocks shall be sized as required by the manufacturer. Boxes shall be cast where exposed to physical damage or installed in an exposed exterior location.

2.6 JUNCTION AND PULL BOXES

A. Provide galvanized steel junction and pull boxes where indicated and as necessary to facilitate installation. Steel shall be minimum 16 gauge. Junction and pull boxes shall be of code required dimensions. Cover shall be of the same type and thickness material as the box construction.

B. Junction and pull boxes intended for dry interior locations shall be NEMA 1 enclosures with accessible, removable screw-on covers. Covers shall be secured with corrosion-resistant screws with keyhole slots to accommodate easy removal.

C. Junction and pull boxes intended for wet or exterior locations shall be NEMA 3R enclosures with hinged gasketed covers. Interior and exterior shall be finished with a gray enamel powder coat over the galvanized metal. Hinge shall be galvanized steel with stainless steel pin. Covers shall be secured with corrosion-resistant zinc plated lockable pull catches.

D. Custom fabricated medium to large junction and pull boxes shall have internal structural steel bracing welded to form a rigid assembly adequate to maintain alignment and shape in shipment and installation.

2.7 SAFETY DISCONNECT SWITCHES

A. Switches shall be three-pole heavy-duty type rated for 600V in NEMA 1 (interior dry applications) and NEMA 3R (exterior applications) enclosures unless noted otherwise on the drawings. All switches shall be horsepower rated and suitable for service entrance

use. Provide with solid neutral where four wire circuits are indicated and with 200% solid neutral where neutrals are sized for 200% full load ampacity.

1. Operating mechanisms shall be quick-make/quick-break. Current-carrying parts shall be high-conductivity copper. Contacts shall be silver-tungsten or plated. Provide positive pressure fuse clips and switch operating mechanism suitable for continuous use at rated capacity without auxiliary springs in current path. Switches shall withstand available fault current or let-through current before operating, without damage or rating change.
2. Terminations shall be suitable for copper or aluminum conductors 60°/75° C rated. Clear shielding shall prevent accidental contact with energized line terminals.
3. The cover shall be mechanically interlocked to prevent access unless the disconnect is in the OFF position. A defeater shall be provided to bypass this interlock. With the door open, an interlock shall be provided to prevent inadvertent closing of the disconnect. Padlocking facilities shall be provided to positively lock the disconnect in the OFF position with from one to three padlocks with the door open or closed.
4. The enclosure shall be given a phosphatizing pretreatment. The paint finish shall be manufacturer's standard color and shall pass 600 hours of corrosion resistance testing per ASTM B 117.

B. Fused switches shall have short circuit ratings no less than 100,000 amperes RMS, with capabilities to 200,000 amperes when used with Class J, L or R fuses at 480V from 400A to 1200A.

C. Manual Motor Starters shall have quick make, quick break toggle mechanisms with allowance for up to 10% field adjustment in nominal overload heater values. Manual Motor Starters shall be NEMA 1 (interior dry applications) and NEMA 3R (exterior applications) enclosed unless noted otherwise on the drawings. Provide Cutler Hammer type MS manual starters for applications up to 1 HP at 240V single phase and type B100 for up to 1 HP at 277V single phase. Permanent provisions shall be included to allow locking the disconnect in the OFF position.

2.8 MOTOR STARTERS

A. The Motor Starters shall be 600 volt class NEMA rated suitable for operation on a three-phase, 60-Hertz system. The system operating voltage shall be as indicated on the drawings.

B. Combination Starters

1. Combination starter units shall be full voltage non-reversing, unless shown otherwise, and shall utilize Motor Circuit Protectors. Minimum size shall be NEMA Size 1. Maximum across-the-line starter shall be NEMA size 2 unless noted otherwise on the Drawings. Starter units shall have NEMA rated electronic overload relays. Hand reset shall be by insulated button on outside of starter unit enclosure.
2. Each combination unit shall be rated 100,000 AIC symmetrical at 480V. The HMCP shall provide adjustable magnetic protection and be provided with pin insert to stop magnetic adjustment at 1300% motor nameplate full load current to comply with NEC requirements. All HMCP combination starter units shall have a "tripped" position on the unit disconnect and a push-to-test button on the HMCP.

Type HMCP motor circuit protectors shall include transient override feature for motor inrush current.

3. Line starters shall be electrically operated, electrically held, three-pole assemblies with arc extinguishing characteristics and shall have silver-to-silver renewable contacts. They shall have provisions for a total of eight NO or eight NC auxiliary contacts and shall include NO/NC contacts as scheduled on the drawings.
4. Overload relays (equal to Eaton C440) shall be NEMA rated electronic with:
   a. Field selectable trip Class
   b. Phase loss trip
   c. Selectable (on-off) phase imbalance and ground fault trip
   d. Reset from outside enclosure by insulated button.
5. Provide fused (two primary and one secondary) control power transformer, LED indicating lights (green power available/energized and red/running), Hand-Off-Automatic (HOA) selector switch and two normally open and two normally closed contacts for each starter, unless scheduled otherwise on Drawings. Device panel mounted on the face of the starter shall accommodate a minimum of six oil-tight pilot control devices.
6. An operating mechanism shall be mounted on the primary disconnect of each starter unit. It shall be mechanically interlocked with the unit door to prevent access unless the disconnect is in the OFF position. A defeater shall be provided to bypass this interlock. With the door open, an interlock shall be provided to prevent inadvertent closing of the disconnect. Padlocking facilities shall be provided to positively lock the disconnect in the OFF position with from one to three padlocks with the door open or closed.

C. Manual Motor Starters – Refer to Safety Disconnect Switches

D. Enclosure

1. The type of enclosure shall be in accordance with NEMA Standards for Type 1A with gasketed doors.

   1 General; 3R Weatherproof

2. The enclosure shall be given a phosphatizing pretreatment. The paint finish shall be manufacturer's standard color and shall pass 600 hours of corrosion resistance testing per ASTM B 117.

E. Motor Starters shall be as manufactured by Cutler-Hammer, General Electric, Siemens or Square D.

2.9 LIGHTING FIXTURES

A. Provide lighting fixtures, equipment and components where shown on Drawings, as listed in fixture schedules and as specified, wired and assembled. Provide approved aligned canopies, hangers and other appurtenances as required, for a complete and functional system.

B. Refer to the lighting fixture schedule for specific ballast requirement. In general:

1. LED luminaires shall have a luminous efficacy of at least 90 lumens/watt, a color temperature of 3500 K (unless noted otherwise on the plans), a CRI of at least 80, an estimated life of at least 50,000 hours at 70% lumen maintenance, and

shall include a minimum 5-year warranty on the entire luminaire including drivers. The luminaire and LEDs shall have been tested in accordance with LM-79 and LM-80.

2. Electronic ballasts that operate T-5 and compact fluorescent lamps shall have end-of-lamp-life shut down to protect against lamp overheating.

C. Refer to the lighting fixture schedule for specific lamp type, CRI and color.

D. Verify ceiling constructions, and provide frames, rings and other accessories suitable for construction encountered.

PART 3 - EXECUTION

3.0 DEMOLITION

A. General

1. The Electrical Contractor shall visit the site before submitting his bid to familiarize himself with the existing conditions and the extent of the work. No extra compensation will be allowed for work required to be performed or to overcome existing conditions, by failure to visit the site.
2. The Electrical demolition work shall be performed by the Electrical Contractor in cooperation with the other trades and as scheduled and approved by the Owner's Representative.
3. The locations of existing equipment to remain including piping, ductwork, conduits, etc., are shown in an approximate way only. The Contractor shall determine the exact location of all existing equipment before commencing work.
4. Power outages caused by demolition that affect other areas shall be held to a minimum. Shutdowns shall be coordinated with the users and the Owner. Night, weekend and/or Holiday time required to perform electrical demolition work or new electrical work shall be carried as part of the Contract Cost.

B. Scope

1. The HVAC drawings illustrate the full extent of the scope of demolition. Disconnect and make safe all electrical equipment identified for removal on the Electrical, HVAC, Plumbing and Fire Protection plans. The electrical scope may extend beyond the area defined by the architectural demolition limits to fully comply with various requirements of these specifications.
2. The electrical demolition plans and details indicate the general scope and are not intended to show all items to be removed or retained. Devices and equipment located on walls and/or ceilings to be removed shall be disconnected and made safe. The Electrical Contractor shall notify the Owner's Representative of any unanticipated hidden conditions encountered during demolition.
3. The Electrical Contractor shall circuit trace and label all existing branch circuits and feeders within the area of demolition scope prior to de-energizing and disconnection. All circuits within panelboards identified for removal shall be traced and labeled to ensure that no area outside the demolition scope limit is affected.
4. The Electrical Contractor shall identify all branch circuits, feeders and system components, which are to remain within the area of demolition scope. There shall be no interruption of service to any area outside the scope limits without approval from the Owner's Representative. Existing equipment to remain shall be left in a code compliant manner.

5. The Electrical Contractor shall de-energize and remove all conductors and raceways to their points of origin within the area of demolition scope. Items identified for demolition shall not be abandoned in place. Raceways that enter masonry walls and floors shall be cut flush at the surface for patching by others. All circuit breakers associated with the demolition scope shall be de-energized and labeled spare.
6. The Electrical Contractor shall be responsible for the repair of all systems or building components damaged during the execution of the work. Damage shall include but not be limited to destruction or disposal of items intended to remain or to be salvaged.
7. The Electrical Contractor shall temporarily support all items to remain that are affected by the demolition of building structural components (walls, ceilings, etc.). Temporarily supported items shall be permanently supported and installed when finalized structures are in place.
8. The existing fire alarm system shall remain fully functional during the entire demolition and construction period. Reuse of existing fire alarm system raceways shall not be allowed. All required system shutdowns shall be coordinated with and approved by the Owner's Representative and the Authority Having Jurisdiction. Demolition of the existing system shall not commence until the new system has been completely installed, tested and approved by the Authority Having Jurisdiction.
9. All demolition scope associated with low voltage systems including but not limited to telephone, data, security, paging, CCTV, etc. shall be included.

C. Disposal

1. All removed items shall be legally disposed of unless identified for reuse. Refer to Part 1 of this specification for requirements for Hazardous Material disposal.
2. The Owner's Representative shall inspect all retained items prior to placement in the identified storage location by the Electrical Contractor . Selected items will be disposed at no additional cost to the project.

3.1 IDENTIFICATION

A. Nameplates

1. Provide nameplates on all equipment listed in other sections of this specification including but not limited to switchboards, substations, panelboards, transformers, junction and pull boxes, disconnect switches, motor starters and motor control centers, contactors, time clocks, remote control stations, fire alarm panels, smoke detector remote test/alarm stations and fire alarm annunciators.
2. Nameplates shall designate equipment tag number as defined on the drawings, system voltage where applicable, circuit number, device controlled and system function. Refer to typical nameplate detail on the drawings for additional requirements.
3. Submit a complete list of proposed nameplates prior to order to ensure conformance to design criteria. Submittal shall include nomenclature, size and layout of each tag.
4. Samples of stickers together with color schedules shall be submitted during the submittal phase of this project.

B. Equipment Identification

1. Equipment identification designations shall be taken from equipment schedules and coordinated with the Owner's facility group to assure designations match up with Owner's maintenance management system identification database.

3.2 RACEWAYS AND CONDUIT

A. General

1. Unless specified or shown on Drawings otherwise, install raceways and conduits concealed. Raceways and conduits may be run exposed on unfinished walls and basement ceilings with exposed structure, in mechanical rooms, electric rooms, attics and roof spaces.
2. Run concealed raceways and conduits in as direct lines as possible with minimum number of bends of longest possible radius. Install exposed raceways and conduits parallel to or at right angles to building lines.
3. Raceway and conduit runs shall be mechanically and electrically continuous from supply to outlet. Conduit shall enter and be secured to metallic enclosures with lock nut and bushing inside. Provide additional exterior lock nut for RGS connections. Bushings shall be the bonding type for conduit connections to metallic enclosures with concentric or eccentric knockouts. Lock nuts and bushings will not be required where conduits are screwed into threaded hubs.
4. Size raceways and conduits as required by NEC unless oversized raceways and conduits are shown on the Drawings. Raceways and conduits shall be ¾" minimum.
5. Install conduit systems complete before installation of conductors. Blow through and swab after plaster is finished and dry, and before conductors are installed.
6. Raceways and conduits supports shall be rigidly attached to the building structure utilizing corrosion resistant components suitable for use with the selected raceway or conduit. Refer to the seismic restraint sections of this specification for any additional requirements.
7. Field bending, cutting and threading shall be executed with the proper tools, resulting in bends and shortened conduits and raceways that are equivalent to factory fabricated and purchased components.
8. Provide standoff clips for conduits on exterior and wet location walls.
9. Protect all vertical conduit runs from the entrance of foreign material before installation of conductors and the final closure of the raceway system. All spare conduits (vertical and horizontal runs) shall be sealed with a bushing and appropriate insert to prohibit entrance of debris or vermin. Affix a label that indicates "Spare Conduit to _____" at each seal. Label shall be in accordance with the labeling section of this specification.

B. Rigid Galvanized Steel (RGS) Conduit

1. RGS may be used for all raceway applications outlined for EMT and PVC. RGS shall be used in locations where subject to accidental damage or abuse and for all above grade exterior applications unless other wiring methods are specified on the drawings. All circuit conductors in excess of 600 V shall be installed in RGS.
2. RGS shall not be used in corrosive environments.
3. All RGS fittings shall be threaded. Utilize Erickson couplings where joining two threaded conduits that cannot be rotated.

C. Electrical Metallic Tubing (EMT)

1. EMT may be used for lighting and receptacle branch circuits, telephone, fire alarm, communications, signal and instrumentation circuits and for control circuits. EMT may be used in masonry walls, above hung ceilings, in equipment rooms, in mechanical and electrical chases and closets, in exposed locations along ceilings or walls above normal traffic level and where not subject to accidental damage or abuse.
2. EMT shall not be used in exposed applications below 8 feet above finished floor or in exterior or damp/wet/corrosive locations. Electrical, telephone and communications closets are considered exempt from this restriction and EMT may be installed below 8' AFF in this application only. EMT shall not be installed underground, in slabs on grade, in exterior locations, in hazardous areas, or for circuits operating at more than 600 V.

D. Miscellaneous Conduit Fittings

1. Expansion/Deflection Fittings: Raceways and conduit buried or secured rigidly on opposite sides of building expansion joints and long runs of exposed conduit subject to expansion and contraction due to variations in temperature shall have expansion fittings. Raceways and conduit shall cross building expansion joints at right angles. Provide separate external copper bonding jumper secured with grounding straps on each end of fitting. Fittings shall safely deflect and/or expand/contract to twice the distance of potential movement.
2. Penetrations of all below grade exterior walls and flooring shall require approval by the Engineer. Submit proposed penetration points, size openings and penetration methods to Engineer and Architect. Penetrations shall utilize sealing fittings appropriately sized for the application. Duct bank penetrations are excluded from this requirement.
3. Sealing Fittings shall be installed wherever conduits pass from warm to cold locations to minimize condensation within the conduit. Sealing fittings shall be installed with RGS penetration of the wall and terminate in a suitably sized junction box.
4. Refer to other specification sections for requirements pertaining to sealing for hazardous atmospheres.

E. Flexible Metallic Conduit

1. Provide flexible metallic conduits for connections to electrical equipment and to equipment furnished under other Divisions that are subject to movement, vibration or misalignment and/or where noise transmission must be eliminated or reduced.
2. Flexible metallic conduit shall be liquid-tight under the following conditions:
    a. Exterior locations
    b. Moisture or humidity-laden atmospheres
    c. Environments where seepage or dripping of water, grease, oil or other fluids is possible. All mechanical equipment rooms and penthouses, kitchens and;
    d. Corrosive atmospheres

F. Wireways shall be provided where specifically shown on the drawings or where the group mounting of controllers, disconnects, enclosures, etc warrant the use for elimination of multiple short conduit runs. Wireways shall be provided complete with all required appurtenances necessary to have a totally enclosed system rated for the environment. Wireways shall not be installed in any location where subject to accidental damage or abuse.

3.3 WIRE AND CABLE (600V)

A. Homerun designations on the drawings are diagrammatic only. Install branch circuits and feeders from the power source to the attachment point as required for a complete system. Provide slack wire for connections to equipment installed by others. Refer to schedules and risers where specific conductor and associated raceway sizes are not indicated on the floor plans.

B. Connect branch circuit homerun with two or three circuits and common neutral only where specifically shown on the drawings. Circuits with common neutrals shall not be connected to the same phase to ensure cancellation of the return current in the neutral conductor.

C. Install wires and cable in raceways as specified. All conductor sizing is based upon no greater than three current carrying conductors in a conduit. Installation of up to six circuits (no greater than twelve current carrying conductors) in a single conduit will be allowed if the conductor sizing is increased to the required ampacity to accommodate de-rating factors required by the NEC and NFPA 70.

D. The minimum wire size shall be #12 unless #14 specifically allowed on the drawings for wiring of controls. Branch circuits longer than 75' for 120 V and 175' for 277 V from panel to last outlet shall be increased a minimum of one size above that shown on the drawings to minimize voltage drop to less than 3%.

E. Conductors shall be identified at all accessible locations in the following manner:

1. Color code secondary service, feeders and branch circuit conductors as follows:

208/120 Volts	**Phase**	**480/277 Volts**
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green

2. Provide nonferrous wire markers, embossed or printed to correspond with the Drawings. Labels shall be permanently marked so that the source of the branch circuit or feeder may be readily identified. Hand written labels are not acceptable. Embossed tag equal to 3M Scotch Code STL-TAG or SCS-TM shall be applied with two miniature cable ties or slipped through both end holes. Heat bonded tag equal to 3M Scotch Code SCS-HB shall be permanently affixed with a heat gun.

F. Cable

1. Flexible Metal Clad (MC) cable * may be used in concealed locations for branch circuit wiring.
2. Flexible Armored (AC) cable *may be used in concealed locations for branch circuit wiring.
3. Conductor color code shall comply with identification requirements as indicated in this Section.

G. Splices and Terminations

1. No more than twelve splices of current carrying conductors or six circuits, whichever is greater, shall be allowed in a single enclosure or junction box.

2. Splices and terminations shall be sized to the specified conductor. The insulation shall be cut back with the appropriate tools such that the conductors are not nicked or damaged.
3. The compression tool shall be appropriate for the installation of the provided lug or butt splice to ensure pressure necessary for a proper connection is applied.
4. Terminations shall not be stacked or bent unless specifically listed for the application.

H. Cable Pulling

1. Pull cables that share conduit at same time into completely installed raceway. Conductors shall not be pulled in raceways with existing wiring.
2. Submit cable pulling calculations for engineers' approval prior to all mechanically assisted pulls. Attach pull ropes to conductors with basket-weave grips on pulling eyes. Provide means to measure tension during entire pull. Utilize pulling compounds to lessen friction in accordance with the manufacturer's recommendations.
3. Mechanically assisted pulls shall utilize equipment specifically designed for the purpose such as ropes, electric wench, pulleys, etc. The use of a motorized vehicle to assist in a cable pull is prohibited.

3.4 WIRING DEVICES AND PLATES

A. Branch circuitry shall be attached to all devices using the attachment screw or utilizing back wiring chambers that utilize screws for compressing the connection on the wire. Quick stab features that do not require a positive screw on attachment for the conductor are not acceptable.

B. Receptacle devices for other than 20 amp, 120 volt, 2-wire, circuits shall be provided with tags indicating voltage characteristics and circuit number of outlet that match the nameplate or engraving required on the faceplate.

3.5 OUTLET BOXES

A. Outlet and switch boxes shall be securely fastened to metal studs with a minimum of two self-tapping screws. Boxes three gang and greater shall be securely fastened to studs on both sides of the box.

B. Fasteners for mounting boxes in damp or wet locations shall be stainless steel.

C. Pressed steel boxes shall not be used for exposed surface mounted locations below 8'0" AFF.

D. Outlet and switch boxes shall not be installed back to back. Stagger box installation to adjacent stud spaces to maintain sound separation between rooms.

3.6 JUNCTION AND PULL BOXES

A. Junction box covers shall be accessible. Do not install junction boxes above suspended ceilings except where ceiling is removable or where an access panel is provided.

B. Pull boxes connected to concealed conduits shall be mounted with covers flush with finished wall or ceiling.

C. Pull boxes exposed to rain or in damp/wet locations shall be weatherproof NEMA 3R unless noted otherwise on the drawings.

D. No pull box shall be within 2 feet of another.

E. Provide clamps, grids, cable ties and other non-conductive or combustible appurtenances to secure cables. No cable shall be unsupported for more than 30". Cables shall not touch or be unsupported within 1” of the box cover.

F. Each junction and pull box shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load of the associated branch circuits or feeders.

G. Submit box sizing calculations to confirm all box dimensions are in accordance with code requirements with product data prior to installation.

3.7 SAFETY DISCONNECT SWITCHES

A. Provide safety disconnects as required and indicated on the drawings. Each motor shall be provided with a local disconnecting means in accordance with code requirements.

B. Manual motor starters may be used for 120, 208, 240, or 277V, single-phase motors up to 1 HP. Switches shall disconnect all ungrounded conductors. Overload heating elements shall be properly sized and coordinated for the associated motor in accordance with code and manufactures recommendations.

C. Disconnect switches for all applications with available fault current in excess of 10,000 amperes RMS symmetrical shall be fusible. Fuses shall be Class J, L or R and rejection clips shall be installed in the fuse holders to prohibit the installation of non-current limiting fuses.

D. Each disconnect switch shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load.

3.8 MOTOR STARTERS

A. Each starter shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load.

B. Overload relay heater ratings shall be properly sized and coordinated for the associated motor in accordance with code and manufacturers recommendations.

C. Field Adjustments

1. The following minimum work shall be performed under the technical direction of the manufacturer's service representative.

    a. Verify basic operation of starter from control power source.
    b. Follow the manufacturer’s instruction and the contract documents concerning any short circuit device settings, HMCP settings or timing

relays. All adjustable settings shall be documented and included in the final O. and M. manual.

3.9 LIGHTING FIXTURES

A. Fixtures

1. General
   a. Do not install fixtures until work of other trades that may damage fixtures is completed.
   b. Where seismic requirements are specified herein, fixtures shall be supported as shown or specified.
   c. Handling of reflectors shall be done only with cotton gloves to avoid imprinting fingerprints on reflective surfaces.
2. Accessories
   a. Installation and support of fixtures shall as a minimum be in accordance with the NFPA 70 and manufacturer's recommendations.
   b. Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.
   c. Open type fluorescent fixtures with exposed lamps shall have a wire-basket type guard.
3. Suspended and Pendant Fixtures
   a. Suspended fixtures shall be provided with adjustable swivel hangers in order to ensure a plumb installation.
   b. Single unit suspended LED fixtures shall have twin-stem hangers.
   c. Multiple unit or continuous-row LED units shall have a tubing or stem for wiring at one point, and a tubing or rod suspension provided for each length of chassis including one at each end. Maximum distance between adjacent tubing or stems shall be 10 feet.
   d. Provide threaded rod to rigidly support the weight of the fixture independently of the ceiling support system. Threaded rod shall be concealed where fixture installed in an area with suspended ceilings. Support luminaries on a minimum of two points (one at each end) to prevent rotation. Threaded rod, pendants or factory supplied fixture accessories (such as rods or chains) 4 feet or longer excluding fixture, shall be braced to limit swinging. Bracing shall be 3 directional, 120 degrees apart.
   e. Branch circuitry shall be routed to the outlet box utilizing the wiring methods outlined on the drawings and as described in these specifications. Flexible raceway may be installed to each fixture from an overhead junction where concealed above a ceiling. Fixture to fixture wiring installation is allowed only when fixtures are installed end to end in a continuous run.
4. Ceiling Fixtures
   a. Ceiling fixtures shall be coordinated with and suitable for installation in, on, or from the suspended or gypsum wallboard ceiling provided under other sections of these specifications. Provide plaster frames for fixtures recessed in gypsum board or a plaster ceiling. Recessed fixtures shall have adjustable fittings to permit alignment with ceiling panels.
   b. Recessed fixtures installed in fire-resistive type of suspended ceiling construction shall have the same fire rating as the ceiling or shall be

provided with fireproofing boxes having materials of the same fire rating as the ceiling panels, in conformance with UL-03.

c. Provide safety chain to support the weight of the fixture independently of the ceiling support system. Support luminaries on a minimum of two points (one at each end) to structural support.

5. Support

a. Do not suspend or support lighting fixtures, threaded rod and safety chains from hung ceiling, conduit or duct. Support fixtures with threaded rod and safety chain from structural members only. Provide supplemental steel (factory fabricated channel equal to Unistrut) where required to span structural steel members.

b. Provide supplemental steel below ducts where fixture locations coincide with HVAC duct or mechanical piping runs and access to structure is inhibited.

c. Supplemental steel shall be rigidly supported from structure. Where suspension is required, support supplemental steel with threaded rods to structure. Sizing of all supplemental support components is the responsibility of the Contractor.

END OF SECTION