CITY OF NEWTON
PURCHASING DEPARTMENT

PROJECT FOR PUBLIC BUILDINGS DEPARTMENT

PROJECT MANUAL:

BOILER & RELATED EQUIPMENT REMOVAL AND REPLACEMENT

(Williams Elementary School)

INVITATION FOR BID #11-11

(ReBid for IFB #10-92)

Opening Date: September 17, 2010 at 9:00 a.m.

Plans and Specifications
Prepared by:
RDK Engineers
Contact: Wade Wright (978) 296-6228

August 2010

Setti D. Warren, Mayor

WILLIAMS ELEMENTARY SCHOOL
BOILER REPLACEMENT PROJECT
NEWTON, MASSACHUSETTS

ADDENDUM NO. 3

Addendum Number 3
September 14, 2010
Page 1 of 1

NOTICE TO BIDDERS:

This addendum is issued prior to receipt of bids and does hereby become part of the contract Documents, and in case of conflict, it shall supersede original plans and specifications.

ITEM 1: CONTRACTOR QUESTIONS

Question 1:

I have noted the 2 addendums for the Williams School Boiler bid and have noted the Addendum Number one is dated July 7, 2010 and is for the boiler that was specified for the original (first bid)

I found an issue with the bid form. This form was incorrectly written for the original bid and was questioned during the opining. There is a problem with the alternate listings. It only lists one line for alternates. This was noticed today upon review.

RDK Answer: Please see the attached revised bid form.

CITY OF NEWTON
FORM FOR GENERAL BID

BOILER & RELATED EQUIPMENT
REMOVAL AND REPLACEMENT
Williams Elementary School

TO THE AWARDING AUTHORITY:

A. The undersigned proposes to furnish all labor and materials required for boiler & related equipment removal and replacement in Newton, Massachusetts in accordance with the accompanying plans and specifications prepared by the City of Newton for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

B. This bid includes addenda number(s) _____, _____, _____, _____,

C. The proposed contract price is:

_____DOLLARS ($_____)

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

1. Demolish existing boiler B-2 and provide new boiler as generally shown on drawings MD2.00 and M2.00.
2. Abate all existing breeching, piping and valves, insulation as generally shown on drawings MD2.00 and reinsulated.

COMPANY:_____

The sub-division of the proposed contract price is as follows:

Item 1. The work of the General Contractor, being all work other than that covered by Item 2
Total of Item 1: $ ____N/A_____

Item 2. Sub-bids as follows:

Sub-Trade	Name of Sub-bidder	Amount	Bond Required ? (Yes or No)
N/A	N/A	$ N/A	N/A

Total of Item 2: $ __N/A_____

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

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

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

The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that s/he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A of M.G.L. Chapter 30, s 39M.

The undersigned certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) 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 ("OSHA") 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 (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States OSHA that is at least 10 hours in duration. The undersigned understands that any employee found on a worksite subject to this section without documentation of successful completion of 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 shall be subject to immediate removal.

The undersigned further certifies that s/he intends to comply with the City of Newton Minority/Women Business Enterprise Plan, dated December 19, 1999 to further expand business opportunities for minority firms.

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:_____
(Signature)

_____
(Printed Name and Title of Signatory)

_____
(Business Address)

_____
(City, State Zip)

_____/_____
(Telephone) (FAX)

_____
E-mail address (optional)

NOTE: If the bidder is a corporation, indicate state of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address if different from business address.

END OF SECTION

WILLIAMS ELEMENTARY SCHOOL
BOILER REPLACEMENT PROJECT
NEWTON, MASSACHUSETTS

ADDENDUM NO. 2

Addendum Number 2
September 13, 2010
Page 1 of 1

NOTICE TO BIDDERS:

This addendum is issued prior to receipt of bids and does hereby become part of the contract Documents, and in case of conflict, it shall supersede original plans and specifications.

ITEM 1: CONTRACTOR QUESTIONS

Question 1: Asked if his understanding of the scope was correct:

- Main Scope – One boiler Removed & Replaced (Also BFU, etc.)
- Alt #1 – Second Boiler also removed & replaced
- Alt #2 – Abatement
- Is this correct?

RDK Answer:

- Yes, includes all other base work indicated.
- Yes, includes abatement
- Yes, consists of balance of LPS & LPC and Breeching not abated under the base or alternate #1.

Question 2: Asked if, due to the timeline, at least one of the boilers would have to remain online during the construction?

RDK Answer: Yes, no less than one (1) boiler and support systems to remain operable at all times during construction.

Question 3: Regarding the new Boiler Blow Down Tank: Does RDK specify a manufacturer or size?

RDK Answer: The Blow Down Tank size is indicated on drawing M7.00 (Boiler Blow Down Tank Detail) which indicates minimum tank size through dimensions given. No manufacturer is specified.

Question 4: Asked if abatement of all appurtenances, piping, etc. is included in Alternate #2 or just the Breeching?

RDK Answer: Alternate #2 consist of abating and re-insulating all low pressure steam, condensate, and breeching not addressed by either the base and alternate #1 abatement slopes.

WILLIAMS ELEMENTARY SCHOOL
BOILER REPLACEMENT PROJECT
NEWTON, MASSACHUSETTS

ADDENDUM NO. 1

Addendum Number 1
July 7, 2010
Page 1 of 1

NOTICE TO BIDDERS:

This addendum is issued prior to receipt of bids and does hereby become part of the contract Documents, and in case of conflict, it shall supersede original plans and specifications.

ITEM 1: CONTRACTOR QUESTIONS

Question 1: In Section 15500m Part 2, 2.09.B.3. It says that the boiler is to be set on 16" cast iron sidewall sections. The 16" base is designed for the SMITH 3500. The SMITH 4500 utilizes a 24" base. Can a 24" base be used on the 11.5" cement pad?

RDK Answer: Yes, a 24" Base is required for the SMITH 4500 Boiler.

Question 2: Is there a specific manufacturer for the Boiler Blow Down Tank?

RDK Answer: Bryan, SpriaxSarco or Skidmore are acceptable.

CITY OF NEWTON

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REMOVAL AND REPLACEMENT
Williams Elementary School

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Williams Elementary School

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DRAWINGS – 9 PAGES *PLANS ARE ONLY AVAILABLE FROM OUR WEBSITE:* **www.ci.newton.ma.us/bids**

CITY OF NEWTON
PURCHASING DEPARTMENT
INVITATION FOR BID

The City of Newton invites sealed bids from Contractors for

BOILER & RELATED EQUIPMENT REMOVAL AND REPLACEMENT AT WILLIAMS ELEMENTARY SCHOOL

Pre-bid will be held on site at: **9:00 a.m., September 9, 2010 at 141 Grove Street, Auburndale, MA**
Bids will be received until **9:00 a.m., September 17, 2010**
at the Purchasing Department, Room 204, Newton City Hall, 1000 Commonwealth Ave., Newton, MA 02459. Immediately following the deadline for bids all bids received within the time specified will be publicly opened and read aloud.

Work under this contract shall consist of: demolition and removal of a boiler and installation of a new/unused boiler at the Williams Elementary School. **Work is expected to begin on October 1, 2010 and shall be completed within 120 calendar days**.

Contract Documents will be available online at the City's website: **www.ci.newton.ma.us/bids** after: **10:00 a.m., September 2, 2010.** Bidders are responsible for downloading the specifications from the City's web site at **www.ci.newton.ma.us/bids** . Bidders are requested to email the Purchasing Department (purchasing@newtonma.gov) their Company Name, Address, Email address, Phone & Facsimile number and what bid # (i.e. 11-11) they have downloaded.

All General Bids must be accompanied by a copy of a "Certificate of Eligibility" (DCAM Form CQ-7) issued by the Department of Capital Asset Management and Maintenance (DCAM) and a "Contractor Update Statement" (DCAM Form CQ-3). The category of work for which the Bidder must certified is: **Mechanical Systems or HVAC and Plumbing.**

Award will be made to the bidder with the lowest total contract price, including any accepted alternates, that has been deemed responsible and eligible. **All bids shall be submitted as one ORIGINAL and one COPY.**

All bids must be accompanied by a bid deposit in an amount that is not less than five percent (5%) of the value of the bid, including all add alternates. Bid deposits, payable to the City of Newton, shall be either in the form of a bid bond, or cash, or a certified check, or a treasurer's or cashier's check issued by a responsible bank or trust company.

All bids are subject to the provisions of M.G.L. Chapter 149, Section 44 A-J. **Wages are subject** to minimum wage rates determined by the Massachusetts Department of Labor and Industries pursuant to M.G.L. Chapter 149, Sec. 26 to 27H. The schedule of wage rates applicable to this contract is included in the bidding documents. In addtion, the prevailing wage schedule will be updated annually for all public construction projects lasting longer than one (1) year. You will be required to pay the rates set out in any updated prevailing wage schedule. Increases in prevailing wage schedules will not be the basis for change order requests. The successful bidder will be required to provide a Certificate of Insurance demonstrating current coverage of the type and amounts set forth in the Project Manual**.** The successful bidder will be required to furnish a **Performance and Labor and Materials Payment Bond each in the amount of 100%** of the contract total.

Bidders attention is directed to the requirements of the City of Newton Supplemental Equal Employment Opportunity, Anit-Discriminitation and Affirmative Action Program and also to the Minority/Women Business Enterprise Plan, December 1999, all of which are hereby incorporated into the Contract Documents. In the event of conflict between any of the above listed policies, the stricter policy shall apply.

City of Newton bids are only available on the City's web site, **www.ci.newton.ma.us/bids.** It is the sole responsibility of the contractor downloading these bids to ensure they have received any and all addenda prior to the bid opening. Addenda's will be available online within the original bid document as well as a separate file. If you download bids from the internet site and would like to make it known that your company has done so, you may fax the Purchasing Dept. (617) 796-1227 or e-mail purchasing@newtonma.gov with your NAME, ADDRESS, PHONE, FAX AND INVITATION FOR BID NUMBER.

The City of Newton will reject any and all bids when required to do so by the above referenced General Laws. In addition, the City of Newton reserves the right to waive any informalities in any or all bids, or to reject any or all bids (in whole or in part) if it be in the public interest to do so.

CITY OF NEWTON
Rositha Durham
Chief Procurement Officer
September 2, 2010

CITY OF NEWTON

DEPARTMENT OF PURCHASING

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – BIDDER'S REPRESENTATION

1.1. Each General Bidder (hereinafter called the "Bidder") by making a bid (hereinafter called "bid") represents that:

1.2. The Bidder has read and understands the Contract Documents and the bid is made in accordance therewith.

1.3. The Bidder has visited the site and is familiar with the local conditions under which the Work has to be performed.

1.4. Failure to so examine the Contract Documents and site will not relieve any Bidder from any obligation under the bid as submitted.

ARTICLE 2 - REQUEST FOR INTERPRETATION

2.1 Bidders shall promptly notify the City of any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents, the site, and local conditions.

2.2 Bidders requiring clarification or interpretation of the Contract Documents shall make a written request to the *Chief Procurement Officer*, at purchasing@newtonma.gov or via facsimile (617) 796-1227. The City will answer such requests if received seven (3) calendar days before the date for receipt of the bids.

2.3 Interpretation, correction, or change in the Contract Documents will be made by Addendum which will become part of the Contract Documents. The City will not be held accountable for any oral instruction.

2.4 Addenda will be emailed to every individual or firm on record as having taken a set of Contract Documents.

2.5 Copies of addenda will be made available for inspection at the location listed in the Invitation for Bids where Contract Documents are on file, in addition to being available online at **www.ci.newton.ma.us/bids**.

2.6 Bidders downloading information off the internet web site are soley responsible for obtaining any addenda prior to the bid opening. If the bidder makes themselves known to the Purchasing Dept., at purchasing@newtonma.gov or via facsimile (617) 796-1227, they shall be placed on the bidder's list. Bidders must provide the Purchasing Dept. with their company's name, street address, city, state, zip, phone, fax, email address and **INVITATION FOR BID NUMBER #11-11.**

ARTICLE 3 – MBE PARTICIPATION

3.1 Notice is hereby given that the Mayor's Affirmative Action Plan for the City of Newton, dated December 1999 is applicable to all construction contracts in excess of $10,000.00. A copy of this plan is on file at City of Newton Purchasing Department.

3.2 Notice is hereby given that the City of Newton Minority/Women Business Enterprise Plan dated December 1999 and the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program is applicable to all City contracts for goods and services in excess of $50,000.00. Copies of these plans are incorporated in the bidding documents.

ARTICLE 4 – PREPARATION AND SUBMISSION OF BIDS

4.1 Bids shall be submitted on the "Bid Form" as appropriate, furnished by the City.

4.2 All entries on the Bid Form shall be made by typewriter or in ink.

4.3 Where so indicated on the Bid Form, sums shall be expressed in both words and figures. Where there is a discrepancy between the bid sum expressed in words and the bid sum expressed in figures, the words shall control.

4.4 Bid Deposits shall be submitted in the amount specified in the Invitation for Bids. They shall be made payable to the City of Newton and shall be either in the form of cash, certified check, treasurer's or cashier's check issued by a responsible bank or trust company, or a bid bond issued by a surety licensed to do business in the Commonwealth of Massachusetts; and shall be conditioned upon the faithful performance by the principal of the agreements contained in the bid.

Bid deposits of the three (3) lowest responsible and eligible Bidders shall be retained until the execution and delivery of the Owner/Contractor agreement.

4.5 The Bid, including the bid deposit shall be enclosed in a sealed envelope with the following plainly marked on the outside:GENERAL BID FOR:

NAME OF PROJECT AND **INVITATION NUMBER**

BIDDER'S NAME, BUSINESS ADDRESS, AND PHONE NUMBER

Date and time for receipt of bids is set forth in the Invitation for Bids.

4.6 Timely delivery of a bid at the location designated shall be the full responsibility of the Bidder.

4.7 Bids shall be submitted with one **original** and one **copy.**

4.8 Be advised that a new Massachusetts law has been enacted that required all employees who work on Massachusetts public works construcion sites must have no less than 10 hours of OSHA-approved safety and health training. See Chapter 306 of the Acts of 2004, which will become effective July 1, 2006.

1. This requirement will apply to any general bid or sub bid submitted on or after July 1, 2006 and to any contract awarded on or after July 1, 2006.
2. This law directs the Massachusetts Attorney General to restrain the award of construction contracts to any contractor who is in violation to this requirement and to restrain the performance of these contracts by non-complying contractors.
3. The contractor and all subcontractors on this project will be required to provide certification of compliance with this requirement. Non-compliance with this new Massachusetts Law will disquality you from bidding on public contracts.

ARTICLE 5 – ALTERNATES

5.1 Each Bidder shall acknowledge Alternates (if any) in Section C on the Bid Form.

5.2 In the event an Alternate does not involve a change in the amount of the base bid, the Bidder shall so indicated by writing "No Change", or "N/C" or "0" in the space provided for that Alternate.

5.3 Bidders shall enter on the Bid Form a single amount for each Alternate which shall consist of the amount for work performed by the Contractor.

5.4 The low Bidder will be determined on the basis of the sum of the base bid and the accepted alternates.

ARTICLE 6 – WITHDRAWAL OF BIDS

6.1 Any bid may be withdrawn prior to the time designated for receipt of bids on written or telegraphic request. Telegraphic withdrawal of bids must be confirmed over the Bidder's signature by written notice postmarked on or before the date and time set for receipt of bids.

6.2 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids.

6.3 No bids shall be withdrawn within thirty days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids.

ARTICLE 7 – CONTRACT AWARD

7.1 The City of Newton will award the contract to the lowest eligible and responsible Bidder within thirty days, Saturdays, Sundays, and legal holidays excluded after the opening of bids.

7.2 The City of Newton reserves the right to waive any informalities in or to reject any or all Bids if it be in the public interest to do so.

7.3 As used herein, the term "lowest responsible and eligible Bidder" shall mean the Bidder (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (3) who, where the provisions of section eight B of chapter twenty-nine apply, shall have been determined to be qualified thereunder.

7.4 Subsequent to the award and within five (5) days, Saturday, Sundays and legal holidays excluded, after the prescribed forms are presented for signature, the successful Bidder shall execute and deliver to the City a Contract in the form included in the Contract Documents in such number of counterparts as the City may require.

7.5 In the event that the City receives low bids in identical amount from two or more responsive and responsible Bidders, the City shall select the successful Bidder by a blind selection process such as flipping a coin or drawing names from a hat. The low Bidders who are under consideration will be invited to attend and observe the selection process.

ARTICLE 8 – TAXES

8.1 The Bidder shall not include in this bid any tax imposed upon the sale or rental of tangible personal property in this Commonwealth, such as any and all building materials, supplies, services and equipment required to complete the work.

8.2 The City is exempt from payment of the Massachusetts Sales Tax, and the Bidder shall not include any sales tax on its bid. The City's exemption Number is E-046-001-404.

END OF SECTION

CITY OF NEWTON
FORM FOR GENERAL BID #11-11

BOILER & RELATED EQUIPMENT
REMOVAL AND REPLACEMENT
Williams Elementary School

TO THE AWARDING AUTHORITY:

C. The undersigned proposes to furnish all labor and materials required for boiler & related equipment removal and replacement in Newton, Massachusetts in accordance with the accompanying plans and specifications prepared by the City of Newton for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

D. This bid includes addenda number(s) _____, _____, _____, _____,

C. The proposed contract price is:

_____DOLLARS ($_____)

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

3. Abate existing breeching, piping and valves, as generally shown on drawings MD2.00, and reinstall insulation.
4. Abate existing boiler insulation as generally shown on Drawing MD2.00 and reinstall.

COMPANY:_____

The sub-division of the proposed contract price is as follows:

Item 1. The work of the General Contractor, being all work other than that covered by Item 2
Total of Item 1: $ _____N/A_____

Item 2. Sub-bids as follows:

Sub-Trade	Name of Sub-bidder	Amount	Bond Required ? (Yes or No)
N/A	N/A	$ N/A	N/A

Total of Item 2: $ N/A

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

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

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

The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that s/he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A of M.G.L. Chapter 30, s 39M.

The undersigned certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) 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 ("OSHA") 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 (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States OSHA that is at least 10 hours in duration. The undersigned understands that any employee found on a worksite subject to this section without documentation of successful completion of 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 shall be subject to immediate removal.

The undersigned further certifies that s/he intends to comply with the City of Newton Minority/Women Business Enterprise Plan, dated December 19, 1999 to further expand business opportunities for minority firms.

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:_____
(Signature)

_____
(Printed Name and Title of Signatory)

_____
(Business Address)

_____
(City, State Zip)

_____/_____
(Telephone) (FAX)

_____
E-mail address (optional)

NOTE: If the bidder is a corporation, indicate state of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address if different from business address.

END OF SECTION

CONTRACT FORMS

The forms are provided for informational purposes only.

The awarded bidder will be required to complete and submit the following documents in order to execute a contract pursuant to this bid.

None of the following forms are required at the time of bid submittal.

OWNER-CONTRACTOR CONTRACT

CONTRACT NO. C _____

THIS AGREEMENT made this ___ day of _____ in the year Two Thousand and Ten by and between the CITY OF NEWTON, a municipal corporation organized and existing under the laws of the Commonwealth of Massachusetts, hereinafter referred to as the CITY, acting through its Chief Procurement Officer, but without personal liability to him, and

hereinafter referred to as the CONTRACTOR.

WITNESSETH, that the parties hereto for the consideration hereinafter set forth agree as follows:

ARTICLE 1. **STATEMENT OF WORK.** The Contractor shall furnish all labor, materials, equipment and insurance, and perform all work required in strict accordance with the Project Manual entitled:

Boiler & Related Equipment
Removal and Replacement at Williams Elementary School

hereinafter referred to as the SPECIFICATIONS, and the Addenda thereto numbered _____,and all the Drawings referred to therein.

The said Specifications, Addenda and Drawings are incorporated herein by reference and are made a part hereof.

ARTICLE 2. **TIME OF COMPLETION.** The Contractor shall commence work under this Contract on the date specified in the written notice of the City to proceed and shall fully complete all work hereunder within the time (120 calendar days) stated elsewhere in the contract documents.

ARTICLE 3. **THE CONTRACT PRICE.** The City shall pay the Contractor pursuant to and in accordance with the provisions set forth in the Contract Documents, subject to additions and deductions in accordance with the terms of the Specifications, for the full and satisfactory performance of the Contract the sum of:

ARTICLE 4. **CONTRACT DOCUMENTS.** The Contract shall consist of the following component parts, copies of which are attached hereto:

a. This CITY-CONTRACTOR Agreement;

b. The City's Invitation For Bid #11-11 issued by the Purchasing Department;

c. The Project Manual for Boiler Replacement at Williams School including the Instructions to Bidders; General Conditions; Special Conditions; MWBE/AA Requirements, Wage Rate Requirements and Wage Rate Schedule(s) including any updated prevailing wage rate schedules if applicable; The Supplementary Special Conditions; General Requirements and Project Specifications; and Drawings, if included or referenced therein;

d. Addenda Number(s)_____ ;

e. The Bid Response of the CONTRACTOR submitted for this Project and accompanying documents and certifications;

f. Certificate(s) of Insurance and surety bond(s) submitted by the CONTRACTOR in connection with this Project;

g. Duly authorized and executed Amendments, Change Orders or Work Orders issued by the CITY after execution of this CITY-CONTRACTOR Agreement.

ARTICLE 5. **ALTERNATES.** The following Alternates have been accepted and their costs are included in the Contract Price stated in Article 3 of this Agreement:

Alternates: ___N/A_____.

ARTICLE 6. **APPLICABLE STATUTES.** All applicable federal, state and local laws and regulations are incorporated herein by reference and the Contractor agrees to comply with same.

IN WITNESS WHEREOF, the parties have caused this instrument to be executed under seal the day and year first above written.

CONTRACTOR

By _____
Title_____

Date_____

Affix Corporate Seal Here

City funds in the amount of $_____
Are available in account number
31M115D4-5825

I further certify that the Mayor is authorized to execute contracts and approve change orders

By_____
Comptroller of Accounts

Date _____

CITY OF NEWTON

By _____
Chief Procurement Officer

Date_____

By_____
Commissioner of Public Buildings

Date_____

Approved as to Legal Form and Character

By_____
Associate City Solicitor

Date_____

CONTRACT AND BONDS APPROVED

By_____
Setti D. Warren, *Mayor*

Date_____

CERTIFICATE OF AUTHORITY - CORPORATE

1. I hereby certify that I am the Clerk/Secretary of _____
(insert full name of Corporation)

2. corporation, and that _____
(insert the name of officer who signed the **contract and bonds**.)

3. is the duly elected _____

(insert the title of the officer in line 2)

4. of said corporation, and that on _____
(insert a date that is ***ON OR BEFORE*** the date the officer signed the **contract and bonds**.)

at a duly authorized meeting of the Board of Directors of said corporation, at which all the directors were present or waived notice, it was voted that

5. _____ the _____
(insert **name** from line 2) (insert **title** from line 3)

of this corporation be and hereby is authorized to execute contracts and bonds in the name and on behalf of said corporation, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this corporation's name and on its behalf, with or without the Corporate Seal, shall be valid and binding upon this corporation; and that the above vote has not been amended or rescinded and remains in full force and effect as of the date set forth below.

6. ATTEST: _____ *AFFIX CORPORATE SEAL HERE*
(Signature of **Clerk or Secretary**)*

7. Name: _____
(Please print or type name in line 6)*

8. Date: _____
(insert a date that is ***ON OR AFTER*** the date the officer signed the **contract and bonds**.)

* The name and signature inserted in lines 6 & 7 **must** be that of the **Clerk or Secretary** of the corporation.

ATTESTATION

Pursuant to MG c. 62C, § 49A, the undersigned acting on behalf of the Contractor, certifies under the penalties of perjury that, to the best of the undersign's knowledge and belief, the Contractor is in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.*

_____
**Signature of Individual
or Corporate Contractor (Mandatory)

_____
*** Contractor's Social Security Number
(Voluntary) or Federal Identification Number

By: _____
Corporate Officer
(Mandatory, if applicable)

Date: _____

* The provision in the Attestation relating to child support applies only when the Contractor is an individual.

** Approval of a contract or other agreement will not be granted unless the applicant signs this certification clause.

*** Your social security number will be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended. This request is made under the authority of GL c. 62C, § 49A.

CITY OF NEWTON, MASSACHUSETTS

PERFORMANCE BOND

Know All Men By These Presents:

That we, _____, as PRINCIPAL, and _____, as SURETY, are held and firmly bound unto the City of Newton as Obligee, in the sum of

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

Whereas, the said PRINCIPAL has made a contract with the Obligee, bearing the date of _____ _, 2010 for the construction of _____ in Newton, Massachusetts.
(Project Title)

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

In the event, that the contract is abandoned by the PRINCIPAL, or in the event that the Obligee terminates the employment of the PRINCIPAL or the authority of the PRINCIPAL to continue the work said SURETY hereby further agrees that said SURETY shall, if requested in writing by the Obligee, take such action as is necessary to complete said contract.

In Witness Whereof, the PRINCIPAL and SURETY have hereto set their hands and seals this ___day of _____ 2010.

PRINCIPAL	SURETY
_____	_____
BY_____	BY _____
(SEAL)	(ATTORNEY-IN-FACT) (SEAL)
_____ (Title)	
ATTEST: _____	ATTEST: _____

CITY OF NEWTON, MASSACHUSETTS

PAYMENT BOND

Know All Men By These Presents:

That we, _____, as PRINCIPAL, and _____, as SURETY, are held and firmly bound unto the City of Newton as Obligee, in the sum of

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

Whereas, the said PRINCIPAL has made a contract with the Obligee, bearing the date of _____ _, 2010, for the construction of _____ in Newton, Massachusetts.

(Project Title)

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

In Witness Whereof, the PRINCIPAL and SURETY have hereto set their hands and seals this ___day of_____2010.

PRINCIPAL	SURETY
_____	_____
BY_____	BY _____
(SEAL)	(ATTORNEY-IN-FACT) (SEAL)
_____ (Title)	
ATTEST: _____	ATTEST: _____

GENERAL CONDITIONS
OF THE CONTRACT
FOR NON-TECHNICAL SERVICES

The City of Newton, herein referred to as the City, does hereby establish the following General Conditions, applicable to this Invitation for Bids and any subsequent purchase order, work order, work order or contract resulting therefrom.

1.0 SCOPE OF SERVICES

1.1 The Contractor agrees to furnish all labor, materials, equipment and insurance necessary to perform and fully complete, in every respect, within the time frame herein specified, all work (hereinafter referred as the Services) described in the Project Manual.

1.2 The Contractor shall not make any changes in the scope of Services without the prior written consent of the City. The Contractor shall make reasonable revisions or corrections, within the scope of Services, to any work performed until submitted in a form acceptable to the City.

1.3 The City reserves the right to alter, add to or reduce the Services by delivering to the Contractor written notice specifying the nature and extent of such alteration, addition or reduction. Such notice shall be effective upon the later of actual receipt by the Contractor or upon the date given in such notice. No addition to the Services shall be made unless the City and the Contractor have agreed to such increase in writing.

2.0 CONTRACT TERM

2.1 The obligations of the Contractor identified herein shall commence upon execution of the City-Contractor Contract and shall continue in full force and effect for the duration of the contract term as identified in the Project Manual. The contractor shall commence the performance of services under this contract promptly upon receipt of the City's Notice to Proceed in accordance with the provisions identified in the Project Manual.

2.2 In the event the term of this contract exceeds a period of one year and notwithstanding any provision to the contrary herein, the City shall cancel this contract in the event that funds are not appropriated or otherwise made available to support continuation of performance by the Contractor in any fiscal year succeeding the first year.

3.0 EXECUTION

3.1 All work required hereunder shall be performed as promptly as possible, and in any event within the time herein set forth, and such work shall be subject to approval and acceptance by the City, but such approval and acceptance shall not relieve the Contractor from the obligation to correct any incomplete, inaccurate or defective work, all of which shall be promptly remedied by the Contractor on demand, without cost to the City. The Contractor shall obtain all the required licenses and permits for the work herein described.

3.2 The Contractor shall conform to all determinations and directions of the City concerning the Contractor's delivery of services in the event of inclement weather, equipment failure, picket lines on City property, or labor strikes by the contractor's employees.

4.0 COMPENSATION

4.1 The City shall pay the Contractor for services rendered under this contract in accordance with the amount(s) set forth in the Contractor's General Bid Form and pursuant to the provisions contained in the Project Manual.

4.2 Notwithstanding anything to the contrary contained in the Contract, the City may withhold any payment to the Contractor hereunder if and for so long as the Contractor fails to perform any of its obligations hereunder or otherwise is in default under this Contract including, without limitation, any failure to perform Services in full accordance with the amount sufficient in the reasonable opinion of the City to cure any such default or failure of performance by the Contractor.

4.3 In no event shall the City be required to pay any amounts for work deemed by it to be unacceptable, or which are otherwise disputed. In the event the City disputes any such amounts invoiced, it shall pay all amounts not in dispute and notify the Contractor in writing of the amounts disputed and the reasons therefor.

4.4 No payment made shall constitute or be construed as final acceptance or approval of that part of the Services to which payment relates, or relieve the Contractor of any of its obligations outlined in this Contract. Further, the City shall not be deemed, by virtue of making payments to the Contractor hereunder, to have released the Contractor from any claim or liability, or to have waived any action arising out of the breach of this Contract by the Contractor.

5.0 REPORTS AND DRAWINGS

When the Contractor has been paid for the Services performed by him or her, all reports, drawings, and other material furnished to the City shall become the City's property and may be used by the City (or such parties as the City may designate) thereafter in such manner and for such proposes as the City (or such parties as the City may designate) may deem advisable, without further employment of or additional compensation to the Contractor. The Contractor shall not release or disclose any report, drawing, or other material furnished to the Contractor by the City in connection with the performance of the Contractor's Services

6.0 CONTRACTOR'S ACCOUNTING RECORDS

The Contractor shall keep records pertaining to Services performed (including complete and detailed time records) on the basis of recognized bookkeeping practices, generally accepted accounting principles, and in accordance with such reasonable requirements to facilitate audit as the City may provide. All records shall be available to the City or its authorized representatives for review and audit during normal business hours.

7.0 ASSIGNMENT/SUBCONTRACTING

The Contractor agrees that he will not sell, assign or transfer this Contract or any part thereof or interest therein without the prior written consent of the City.

8.0 REMEDY FOR DEFAULT

If the Contractor, in the sole judgment of the City, shall violate or fail properly to comply with or perform in any material respect any condition, provision, or warranty hereof, the City shall have the right by prior written notice to the Contractor to have the services called for hereby otherwise performed, and/or to terminate this contract without prejudice to any other rights or remedies of the City under this contract. The Contractor shall pay any excess in the City's cost to so procure the services and any related goods, supplies, materials or equipment. In addition, and without limiting any other remedies available to the City, the Contractor shall be liable for all losses, costs and expenses incurred by the City which result from the Contractors noncompliance.

9.0 SUSPENSION OR TERMINATION

9.1 The City shall have the right, upon seven (7) days written notice to the Contractor so stating, to terminate, suspend, or postpone this contract in whole or in part for any reason deemed by the City to be in the public interest. Any such termination, suspension, or postponement shall not give rise to any cause of action for damages against the City. In the event that the City postpones or suspends the Services, the Contractor's time for performance of the Services shall be extended for a period equal to the period of such postponement or suspension. In the event of termination, suspension or postponement, the City shall pay: (a) for services and any related goods, supplies, materials and equipment furnished up to the time of termination, suspension, or postponement at the contract price upon delivery; (b) for work in process in the amount of the Contractor's cost, determined in accordance with ordinary accepted accounting practices, up to the time of termination, suspension, or postponement; and (c) for raw materials purchased by the Contractor as of the date of termination, suspension, or postponement and which are noncancelable at the Contractor's actual cost plus reasonable handling charges, but only to the extent that such raw materials were purchased in reliance upon this contract and are useful solely with respect to this contract.

9.2 Upon receipt of a notice of termination, suspension, or postponement the Contractor shall immediately cease all work hereunder and cancel all orders placed with respect to this contract. The Contractor's failure to so cancel shall relieve the City of the obligations of paragraph 10.1 above.

9.3 The City may postpone, suspend or terminate the Services immediately, by notice, hand delivery or certified mail, if the Contractor violates any of the provisions of this Contract, or fails to perform or observe any of the terms, covenants or conditions of this Contract, or abandons in whole or in part its Services, or becomes unable to perform its Services.

9.4 In the event of termination of this Contract, the Contractor shall promptly deliver to the City all documents, work papers, calculations, computer programs, data, drawings, plans, and other tangible work product, or materials pertaining to the Services performed under this Contract to the time of termination.

10.0 NOTICE

Any action, notice or request required to be taken, given or made by City or the Contractor hereunder may be taken, given or made only by those persons identified for that purpose on the Contract Form. All notices required to be given hereunder shall be deemed properly given if personally delivered, or if mailed by registered or certified mail, postage prepaid addressed to the address and officer identified on the Contract Form.

11.0 PROTECTION OF PROPERTY

The Contractor shall take all reasonable precautions to prevent damage to property, visible and concealed, and shall restore to substantially the same condition existing prior to the Contractor's entry any disturbance or damage to property caused by the Contractor or any person acting under its control.

12.0 INSURANCE REQUIREMENTS

12.1 The Contractor shall provide insurance coverage as listed below. This insurance shall be provided at the Contractor's expense and shall be in full force and effect during the full term of this Contract.

WORKER'S COMPENSATION	
Worker's Compensation:	Per M.G.L. c.. l49, s. 34 and c.. l52 as amended.
GENERAL LIABILITY	
Personal Injury	$1,000,000 each occurrence
	$3,000,000 aggregate
Property Damage	$1,000,000 each occurrence
	$3,000,000 aggregate
VEHICLE LIABILITY	
Personal Injury	$1,000,000 each person
	$1,000,000 aggregate
Property Damage	$1,000,000

12.2 **The City shall be named as additional insured on the Contractor's Liability Policies.**

12.3 The Contractor shall not commence the work until proof of compliance with this Section 13.0 has been furnished to the City by submitting one copy of a properly endorsed insurance certificate issued by a company authorized to write insurance in the Commonwealth. This certificate shall indicate that the contractual liability coverage is in force.

12.4 The Contractor shall file the original and one certified copy of all policies with the City within fifteen (15) days after contract award. If the City is damaged by the Contractor's failure to maintain such insurance and to so notify the City, then the Contractor shall be responsible for all reasonable costs attributable thereto.

12.5 Cancellation of any insurance required by this contract, whether by the insurer or the insured, shall not be valid unless written notice thereof is given by the party proposing cancellation to the other party and City at least thirty days prior to the effective date thereof, which shall be expressed in said notice.

13.0 CONFLICT OF INTEREST

No member, agent or employee of the City shall , during his/her tenure or one year thereafter directly or indirectly, have any interest in any property to be included in, or any contract for property, materials or services to be furnished or used in connection with, this contract or the proceeds thereof.

14.0 COMPLIANCE WITH LAWS

All work to be performed and wages paid under this specification shall be in accordance with all applicable laws, state or federal, and all applicable ordinances, codes, rules, and regulations of the City of Newton, or any public board or office having any jurisdiction, regulation or control over any work to be done hereunder, including minimum wage rates. In particular, without limitation, the Contractor agrees to comply with all regulations pertaining to approvals for federal and

state grants, and with all federal and state environmental laws and regulations. The Contractor agrees to assist in making any submissions to federal or state agencies as may be required in order to meet the requirements in this paragraph.

15.0 INDEMNIFICATION

The Contractor agrees to indemnify and save the City harmless from and against any and all costs, losses, expenses, liabilities, damages or claims for damages, including reasonable attorney's fees and expenses, on account of any injury or damage to buildings, improvements, or property of the City or on account of any injury (including death) or damage to any person, persons, firm, corporation or association, or on account of any infringement or claim of infringement of patents, arising out of or resulting from the deliveries provided for or performed under this contract or from any act, omission or negligence of the contractor, his agents, employees, or assigns. The foregoing provisions shall not be deemed to be released, waived or modified in any respect by reason of any surety or insurance provided by the contractor under contract.

16.0 FORCE MAJEURE

The City may not hold the Contractor liable for any loss, expense or damage incurred by the City on account of failure of the Contractor to deliver services as specified herein, if that failure is caused by state of war, acts of enemies, expropriation or confiscation of facilities used by the Contractor, or compliance with any law, order, or regulation of any federal, state or municipal governmental authority, if the Contractor shall show that such compliance would impair this ability to perform a material provision of this contract, the Contractor having given the City reasonable notice of such cause.

17.0 DISPUTES

All claims, disputes and other matters in question between the City and the Contractor arising out of or relating to this Contract or the breach of it, shall be submitted for resolution to a court of competent jurisdiction in Massachusetts, unless otherwise agreed by the parties. No such action shall be brought, however, until the completion of all Services under this Contract or the earlier termination of this Contract as provided herein, the parties agreeing to negotiate any claims, disputes or other matters in question during the term of this Contract before resorting to litigation. As to all acts or failures to act by either party to this Contract, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events when the other party becomes aware or should have been aware of such acts or failure to act.

18.0 GOVERNING LAW

This contract shall be governed by and construed in accordance with Massachusetts Law.

19.0 LIABILITY

The Contractor is retained solely for the purpose of and to the extent set forth in this Contract. The Contractor's relationship to the City for the purpose of services to be performed under this Contract shall be that of an independent contractor. The Contractor shall have no capacity or authority to involve the City in any contract or to incur any liability on behalf of the City. In no event shall the City be held liable as an employer or otherwise for any personal injury to or death of the Contractor's principals, employees, agents and/or representatives occasioned by or resulting from the Contractor's performance under this Contract.

20.0 LIENS

The Contractor shall cause to be removed from the property of the City any liens or other claims asserted by any person or entity claiming through or under the Contractor and arising out of Services performed under this Contract by such third party.

21.0 SEVERABILITY

In the event that any portion of this Contract is held illegal or unenforceable by a court of competent jurisdiction, the parties agree that such invalidity shall not affect the validity of the remaining portions of this Contract and Contractor and the City agree to substitute for the invalid provision a valid provision which most closely approximates the economics and intent of the invalid provision.

END OF SECTION

PUBLIC BUILDING MAINTENANCE CONTRACT
SUPPLEMENTAL CONDITIONS
COMMONWEALTH OF MASSACHUSETTS & CITY OF NEWTON

Article 1 – Method of Paying Subcontractors
(MGL. C.30, s.39F) ….....

Article 2 – Method of Paying General Contractors
(MGL. C.30, s.39K) ….....

Article 3 – Claims for Unforeseen Conditions
(MGL. C.30, s.39N) ….....

Article 4 – Claims for Delay
(MGL. C.30, s.390) ….....

Article 5 – Decisions and Approvals by Engineer
or Architect
(MGL. C.30, s.39P) ….....

Article 6 – Preference in Employment, Wages
(MGL. C.149, s.26) ….....

Article 7 – Hours of Work
(MGL. C.149, s.34) ….....

Article 8 – Work by Foreign Corporations
(MGL. C.30, s.39L) ….....

SPECIAL CONDITIONS - COMMONWEALTH OF MASSACHUSETTS

Article 1. METHOD OF PAYING SUBCONTRACTORS

(General Laws, Chapter 30, Section 39F as most recently amended by Chapter 450, §76 of the Acts of 1996)

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

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

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

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

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

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

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

amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by a decree of a court of competent jurisdiction.

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

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

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

Article 2. METHOD OF PAYING GENERAL CONTRACTORS

(General Laws, Chapter 30, Section 39K as most recently amended by Chapter 145 of the Acts of 1991 and Chapter 151 of the Acts of 1993.)

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

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the contractor for correction, any periodic estimate which is not in the

required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of section thirty-nine G shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

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

Article 3. CLAIMS FOR UNFORESEEN CONDITIONS

(General Laws, Chapter 30, Section 39N as most recently amended by Chapter 774 of the Acts of 1972)

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

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

Article 4. CLAIMS FOR DELAY

(General Laws, Chapter 30, Section 390 as added by Chapter 116 of the Acts of 1973)

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

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

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

Article 5. DECISIONS AND APPROVALS BY ENGINEER OR ARCHITECT

(General Laws, Chapter 30, Section 39P, as added by Chapter 1164 of the Acts of 1973)

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

Article 6. PREFERENCE IN EMPLOYMENT, WAGES

(General Laws, Chapter 149 Section 26 as most recently amended by Chapter 665 of the Acts of 1986 and Chapter 552 of the Acts of 1991).

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

Article 7. HOURS OF WORK

(General Laws, Chapter 149 Section 34 as most recently amended by Chapter 552 of the Acts of 1991).

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

Article 8. WORK BY FOREIGN CORPORATIONS

(General Laws, Chapter 30 Section 39L, as most recently amended by Chapter 3 of the Acts of 1967).

The Commonwealth and every county, city, town, district, board, commission or other public body which, as the awarding authority, requests
proposals, bids or subbids for any work in the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or other public works (1) shall not enter into a contract for such work with, and shall not approve as a subcontractor furnishing labor and materials for a part of any such work, a foreign corporation which has not filed with such awarding authority a certificate of the state secretary stating that such corporation has complied with sections three and five of chapter one hundred and eighty-one and the date of such compliance, and (2) shall report to the state secretary and to the department of corporations and taxation any foreign corporation performing work under such contract or subcontract, and any person, other than a corporation, performing work under such contract or subcontract, and residing or having a principal place of business outside the Commonwealth.

END OF SUPPLEMENTAL CONDITIONS

BUILDING MAINTENANCE SERVICE CONTRACT

SPECIAL CONDITIONS

The following provisions supplement the General Conditions of the Contract for Non-Technical Services. In the event of conflict or discrepancy between the General Conditions and these Special Conditions, the provisions of the Special Conditions shall govern.

1.0 SUMMARY OF WORK

A. The Work under the Contract consists of:

1. Furnishing all labor, materials, tools, equipment and supervision necessary to accomplish the work described herein,in accordance with all specifications and requirements of the Project Manual.

2. All work either shown on the Drawings (if any) or included in the specifications unless specifically indicated as not to be done.

B. In addition, the work under the Contract includes:

1. Work outside the Project Site as called for in the Contract Documents and as required for the performance of the Work.

2. The restoration of any items damaged or destroyed by encroaching upon areas outside the Project Site.

3. Providing and restoring, where appropriate, all temporary facilities.

C. The Proposed Contract Price shall be complete costs, including overhead, profit, insurance, transportation, and all other costs connected with, or incidental to, the work described.

2.0 PROJECT SITE

A. The areas of work for this contract shall be various buildings within the City of Newton as specified on Work Orders to be issued from time to time during the term of this Contract.

3.0 NOTICE TO PROCEED/FAILURE TO COMMENCE WORK

A. From time to time during the term of this Contract, the Contractor shall be issued notice to proceed in the form of a written Work Order issued by the Public Building Department listing specific work items to be performed in accordance with this Contract. The Contractor shall commence performance of the work within the time specified in the Work Order, and in no event within less than the time limits stated in the Work Specifications contained in the Project Manual.

B. In the event the contractor fails to commence performance within the specified time, and/or notifies the City of its inability to do so, the City shall call upon the second Contractor awarded pursuant to this bid (if any) to perform the required work.

C. In the event the second Contractor awarded pursuant to this bid is unable to commence performance within the required time, or if there is no second Contractor, the City reserves the right to contract for the work on the open market at the then prevailing rate and to deduct from any monies due or that may thereafter become due to the contractor the difference between the price stated for the work in the contract and the actual cost thereof to the City.

D. In the event of Contractor's repeated failure to commence work within the time required by these specifications, the City shall exercise all provisions contained in the General Conditions regarding default, suspension or termination of this contract.

4.0 PAYMENT

A. Once each month, on a date estabished by the City, the Contractor may submit an Application for Payment (Invoice) for the work performed during the preceeding month. The Contractor may invoice for all Work Orders completed and accepted during the preceeding month, and for all Work Orders either partially completed or not yet accepted by the City.

B. Upon receipt of the Application for Payment, the City will, within fifteen days, make payment in full for all Work Orders completed and accepted during the preceeding month. For Work Orders partially completed or not yet accepted, the City will make payment for the value of the Work Order completed during the preceeding month, less a retainage of 5% of the estimated total of the Work Order. The City will make final payment for partially completed Work Orders, including any retained amounts, upon completion and acceptance of the work and receipt of an Application for Payment at the end of the month in which the work is completed and accepted.

5.0 COMMUNICATIONS

A. All notices, demands, requests, instructions, approvals and claims must be in writing.

B. Any such notice shall be deemed to have been given as of the time of delivery, or of actual receipt in the case of telegrams or, in the case of mailing, when it should have been received in due course of post.

C. For communicating purposes, the office address of the Contractor shall be that stated on the signature page of the contract; that of the City shall be as stated in the Invitation for Bids. Any subsequent change in address of either party shall be communicated to the other in writing.

6.0 PLANS AND SPECIFICATIONS

A. The City will furnish to the Contractor, without charge, all copies of the specifications reasonably necessary in the performance of the contract work.

7.0 COORDINATION

The Contractor shall:

A. Supply to the City the name and telephone number of a responsible person who may be contacted during off-hour emergencies during the term of the Contract.

B. Cooperate at all times with the City and the Project Manager, and ensure the cooperation of his key personnel and that of his subcontractors.

8.0 CONDUCT OF THE WORK

A. The work must be completed in a continuous uninterrupted operation. The Contractor must use sufficient workforce and adequate equipment to complete all the necessary work requirements within a minimum period of time.

B. The work shall be conducted between the hours of 8:00 a.m. and 5:00 p.m. on Monday through Friday. No work shall be done on holidays, Saturdays or Sundays except as specifically requested and authorized by the City.

C. Under no circumstances will the contractor be paid at a premium or overtime rate for any work performed without the express advance authorization of the City.

D. The Contractor is responsible for the security of partially completed work until the project is finally accepted by the City.

9.0 ALTERATION

A. The Contractor shall patch, repair and/or replace all existing materials and surfaces remaining exposed after installation of new work which have been affected by alteration or removal of existing work. All patch and repair work shall match existing.

10.0 GENERAL DIRECTIONS

A. Damage to Persons and Property

Any damage to buildings, roads, public roads, bituminous concrete areas, fences, lawn areas, trees, shrubbery, electric or telephone poles, underground utilities, etc., shall be repaired by the Contractor at his own expense. Damaged property shall be returned to its original condition prior to the damages within a reasonable time period, except all utility outages shall be repaired immediately.

B. Protection of Persons and Property

The Contractor shall, at all times, leave an unobstructed way along the roadways and walks, and shall maintain barriers and lights for the protection of all persons and property in all locations where he has materials stored or work going on, and during the entire time such work is going on or material is stored.

C. Shutdown of Services

The Contractor's attention is especially called to the fact that continuous operation of building utilties and services is mandatory. During the period of construction of the new work and/or alterations to the existing work, the progress and sequence of installation shall be carefully planned and approved by the City. If any building is to be left without heat, hot water, city water, electricity, gas, sanitary facilities, or any other services, the Contractor shall provide reasonable written notice to the City before proceeding.

D. Care of Work

All work is to be carefully protected so that no injury will come to it from water, frost, accident, or any other cause and any injury which may come to any of the work shall be repaired immediately by the Contractor at his own expense and without additional cost to the City. This shall also apply to any abutting or adjoining work on premises. The Contractor shall be responsible for any damage and in the event of such damage, the Contractor shall repair the damage immediately at his own cost and without additional cost to the City.

E. Removal of Debris

Debris of any nature shall be completely removed from the site at the end of each days work and disposed of in accordance with all Federal, State and local regulations.

F. The Contractor is responsible for the security of all work until it is accepted by the City.

11.0 TEMPORARY UTILITIES

A. Prior to execution of the Work, the Contractor shall confer with a representative of the Public Building Department regarding the use of utilities and facilities at the worksite. No City utilities or facilities are to be used by the Contractor in the performance of this Contract without the prior approval of the City.

12.0 SUBMISSION OF PAYROLLS

A. The Contractor shall, with each invoice submitted during the term of this Contract, submit to the City two (2) legible copies of his payrolls documenting the wages paid to all employees performing on site labor relating to the work of this Contract. These copies shall be prepared on forms supplied by the City.

13.0 DRAWINGS (IF APPLICABLE)

A. The drawings attached herein and such drawings as may be issued per addendum, shall constitute an integral part of this section and shall serve as the working drawings.

B. Drawings shall not be scaled. Field verification is directed since actual locations, dimensions and levels are existing.

C. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.

14.0 MATERIALS

A. Unless specifically so stated to the contrary the use of a manufacturer's name or style number is not restrictive, and is intended solely as an identification of the type and quality of the materials and services required. In all cases, the words “or approved equal” if not inserted are implied.

B. An item equal to that named or described in the specifications may upon written approval of the City be furnished by the Contractor. An item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design; (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased; (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the specifications.

C. The name and identification of all materials other than the one specifically named shall be submitted to the City in writing for approval, prior to purchase, use or fabrication of such items. Approval shall be at the sole discretion of the City, shall be in writing to be effective, and the decision of the City shall be final. The City may require tests of all materials so submitted to establish quality standards at the Contractor’s expense.

D. For the use of material other than the one specified, the Contractor shall assume the cost of and responsibility for satisfactorily accomplishing all changes that may be required in the work as shown. All directions, specifications and recommendations by manufacturers for the installation, handling, storing, adjustment, and operation of their equipment shall be complied with and responsibility for proper performance shall continue to rest with the Contractor.

E. The Contractor shall not have any right of appeal from the decision of the City condemning any materials furnished if the Contractor fails to obtain the approval for substitution in accordance with these provisions. If any substitutuin is more costly, the Contracotr shall pay for such costs

15.0 WARRANTY AND INDEMNIFICATION

A. In addition to other guarantees or warranties required under law or other sections of the specification, the Contractor warrants all materials furnished and labor performed under this Contract to be free from defects or errors in workmanship or installation for a period of one year from the date of Completion of the work, as certified by the Project Manager. The Contractor shall indemnify the Authority for the full cost of any damage to the property that may result by reason of such defects or errors and shall indemnify the Authority from and against any and all claims, demands. losses, costs, expenses, liabilities and damages, including reasonable attorney's fees and expenses, arising out of or on account of this Contract, including but not limited to claims brought against the Authority for alleged infringement of patents based upon any methods of construction or application of materials furnished under the Contract.

B. The Contractor shall indemnify, hold harmless and defend the City and its departments, officers, employees, servants, and agents from and against all actions, causes of actions, claims, demands, damages, costs, loss of services, expenses and compensation, including attorney’s fees and interest arising out of or resulting directly or indirectly from the services rendered pursuant to this Contract, provided that any such action, cause of action, claim, demand, damage, cost, loss of service, expense, compensation (1) in any way grows out of bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, which (2) is caused in whole or in part by any act or omission of the Contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

END OF SECTION

CITY OF NEWTON

MINORITY/ WOMEN BUSINESS ENTERPRISE PLAN

DECEMBER 1, 1999

STATEMENT OF POLICY:

Whereas it is the policy of the government of the United States of America, the Commonwealth of Massachusetts and the City of Newton that no person shall be discriminated against in any manner whatsoever on the grounds of race, religion, color, sex, handicap or national origin; and

Whereas, it is the policy of the government of the United States of America that no person shall, on the grounds of race, color, sex or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program of activity funded entirely or in pail by the City, the State or Federal government; and

Whereas, it is the policy of the government of the United States of America to encourage that Minority/Women Business Enterprises shall have the maximum practicable opportunity to participate in Federal and State assisted projects; and all City funded contracts; and

Whereas, it is the policy of the City of Newton to encourage that minority/women business enterprises shall have the maximum practicable opportunity to participate in all City funded contracts; and

Whereas, the City of Newton, as a recipient of Federal and State funds subscribes to the above policies and will fully comply With Federal, State and local laws and directives governing non-discrimination, equal opportunity and affirmative action in all municipal activities; and

Whereas, to further enunciate the equal opportunity policy of the City of Newton's Minority/Women Business Program, the following responsibilities are specified

> This MINORITY/ WOMEN Business Enterprise Plan sets forth the administrative standards for the further implementation of the City of Newton's policy of the utilization of minority contractors and subcontractors.
>
> The City of Newton strongly affirms that it will not discriminate in any contractual procedures against any persons because of race, color, religion, age, disability, sex or national origin. This policy shall be administered with a positive supportive attitude.
>
> It is the responsibility of the City of Newton to take affirmative steps to implement this policy to insure equality of opportunity in conducting the Program including notifying those persons and businesses doing business with the City, that contracts for goods, services and construction, shall be made Without reference or regard to race, color, sex, age, handicap, religion or national origin.

Setti D. Warren Mayor

CITY OF NEWTON
MINORITY/ WOMEN BUSINESS ENTERPRISE PLAN

DECEMBER 1, 1999

I. DEFINITIONS:

A. Minority Person- the term includes a person who is of Black Hispanic, Asian, American Indian or Cape Verdean origin.

B. Minority Business Enterprise (MBE) -- the term shall mean a business a) that is certified by SOMWBA; or b) 1 provides evidence satisfactory to the City's Affirmative Action Officer that it is a business owned or controlled by one or more of the following:

- an individual who is a minority person,
- a partnership or joint venture controlled by minority persons in which at least 51 % of the ownership interest is held by minority persons or,
- a corporation or other entity controlled by minority persons and in which at least 51 % of the stock is owned by one or more minority persons.

C. Contract Compliance Officer - the Chief Procurement Officer or his/her designee responsible for the implementation of Newton's Minority/Women Enterprise Plan ("MWBE Plan") and activities.

D. MCAD - Massachusetts Commission Against Discrimination.

E. SOMWBA -- State Office of Minority/Women Business Assistance,

F. City - The City of Newton.

G. Women Business Enterprise (WBE) - the term shall mean a business a) that is certified by SOMWBA; or b) provides evidence satisfactory to the City's Affirmative Action Officer that it is a business owned or controlled by one or more of the following:

- an individual who is a woman.
- a partnership or joint venture controlled by women in which at least 51% of the ownership interest is held by women, or
- a corporation or other entity controlled by women and in which at least 51% of the stock is owned by one or more women.

H. MWBE – Minority or Women Business Enterprise

II. GOALS:

Newton's Minority/Women Enterprise Plan ("MWBE Plan") shall be guided by the goals presented below to promote minority/women opportunities within the City.

These goals comprise the framework for those activities to be implemented as part of the MWBE Plan:

To take affirmative action in expanding opportunities for minority and women owned firms in obtaining contracts within the City of Newton.

To assure that all contractors, regardless of race color, religion, creed, national origin, sex, age, ancestry or handicap, shall have equal opportunity to City contracting activities.

To award, of the total annual City contract dollars expended, 10 percent to MBE and 5 percent to WBE for construction; for goods and services, 5 percent WBE and 5 percent MBE.

III. SOLICITATION ACTIVITIES:

To notify MWBEs of upcoming contracts for construction, professional services and supplies, funded in whole or in part with Federal, State, and City funds, the following activities will be undertaken. In addition on a regular basis, the City of Newton will distribute to its listing of MWBEs and SOMWBA, a summary of upcoming contract opportunities which are subject to the City's MWBE Plan.

A. Construction Contracts

All construction contracts with an estimated value over $50,000 will be formally advertised within local, regional, minority and special interest publications at least 14 days prior to the bid opening date.

For all such construction contracts a "Notice of Solicitation" of a project going out to bid will be distributed to appropriate SOMWBA or City certified firms at least 14 days prior to the bid opening date.

B. Contracts for Professional Services

The City of Newton will send notification of its advertised Request for Proposals to appropriate! SOMWBA or City certified firms Responding MWBE firms will be considered for contract award within the bounds of generally accepted management practice or with the applicable procurement law relating to securing the lowest cost and best services available.

C. Procurement of Supplies

The City of Newton will (where feasible) utilize MWBEs for the procurement of supplies in accordance with City purchasing procedures. These efforts will be documented and reported to MCAD, and the Mayor's office on a quarterly basis.

IV. CONSTRUCTION ACTIVITIES:

A. Goals

The City of Newton bid documents and contracts with an estimated value over $50,000 will contain the City's goal of 10% for MBE and 5% for 'WBE utilization for subcontracts,

B. Pre-Bid Conference

To affirmatively further the opportunities available to prospective bidders, the City will hold a pre-bid conference 5-7 days prior to the bid opening date for all City construction contracts and subcontracts with an estimated value over $50,000.

The pre-bid conference will provide an opportunity for contractors to: review and clarify the technical requirements of the projects, review the City's MWBE Plan; and review Equal Opportunity requirements. The City will advertise this conference and extend invitations to interested contractors as part of the notice of solicitation.

C. Bid Submission

All bids for City of Newton contracts with -an estimated value over $50,000 shall include a certification of intent to be completed by the bidder swing his/her intent to comply with the City's MWBE Plan. Failure to include this certification shall be an informality which may be waived if such certification is received prior to the award of the contract.

D. Contract Execution

Upon notification of award of the contract, the bidder shall provide a written plan detailing how it will comply with the MWBE Plan

E. Monitoring

Throughout the duration of the contract, the City of Newton through its Contract Compliance Officer, will monitor the progress and activities of all contractors and subcontractors as they attempt to comply with the MWBE Plan.

F. Enforcement

In the case of clear neglect to make a good faith effort to comply with this MWBE Plan, the City of Newton reserves the right to designate contractor, after a hearing, as ineligible for future City bid awards.

V. CONTRACT COMPLIANCE OFFICER/DUTIES AND RESPONSIBILITIES:

The Contract Compliance Officer, as liaison between minority firms and the City of Newton will have the overall responsibility for the implementation of Newton's MWBE Plan. This responsibility includes the development, management, dissemination of information; the provision of technical assistance to minority firms including clarification of procedures to be implemented; maintenance of relevant documentation; completion of reporting requirements; and performance of monitoring and evaluation activities; and maintenance and updating of listings of minority/women business.

The Contract Compliance Officer has oversight of all City procurements for construction, professional services and supplies and shall coordinate the implementation of the MWBE Plan with other City departments.

THE CITY OF NEWTON, MASSACHUSETTS
SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY
ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. The requirements hereinafter set forth apply to construction contracts which involve an expenditure by the City of $50,000 or more.

II. For purposes of this contract "minority" refers to Asian Americans, Black, Hispanics American Indians and Cape Verdeans. The City refers to the- City of Newton

III. During the performance of this contract the Contractor and all of (his) Subcontractors (hereinafter collectively referred to as the Contractor) , for himself, his assignees, and successors ,in interest, agree as follows:

1. In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, age or sex. The aforesaid provision shall include, but not be limited to, the following: layoff; termination; rates of pay or other forms of compensation; conditions or privileges of employment; and the selection of apprenticeship. The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the City setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (MGL Chapter 151B) . (See Attachment A)

2. In connection with the performance of work under this contract, the Contractor shall undertake in good faith, affirmative action measures designed to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, age or sex, and to eliminate and remedy any effects of such discrimination -.in the past. Such affirmative action shall. entail positive and aggressive measures to ensure equal employment: opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, 'Layoff or termination, rate of compensation, and in-service or apprenticeship training programs. This affirmative action shall. include all action required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, age or sex. A 'purpose of- this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future City public construction projects

IV.

1. As part of this obligation of remedial action under the foregoing section, the contractor shall maintain on this project a not less than 5 percent ratio of minority employee man hours to total man hours in each job category, including, but not limited to, bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers, and those "classes of work" enumerated in Section 44C of Chapter 149 of the Massachusetts General Laws.

2. In the hiring of minority journeymen, apprentices, trainees and advanced trainees, the Contractor shall rely on referrals, from the Contractor's affirmative action program approved by the City, traditional referral methods utilized by the construction industry, and referrals from agencies, not more than three in number at any one Lime, designated by the Liaison Committee or the City.

V.

1. At the discretion of the City, there may be established for the life of this contract a body to be known as the Liaison Committee, The Liaison Committee shall be composed of the Compliance Officer and one representative each from the Departments administering this project, hereinafter called the administering Departments, and such other representatives as may be designated by the City.

2. The Contractor (or, his/her agent, if any, designated by him/her as the onsite equal employment opportunity officer) shall recognize the Liaison Committee as the affirmative action body, and shall establish a continuing working relationship with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.
3. The Contractor shall prepare manning tables on a quarterly basis.* These shall be broken down into projections, by week, for workers required in each trade. Copies shall be furnished one week in advance of the initiation of work and quarterly thereafter to the City and to the Liaison Committee.

4. Records of employment referral orders, prepared by the Contractor, shall be made available to the City and to the Liaison Committee on request.

5. The contractor shall prepare weekly reports in a form approved by the City of hours worked in each trade by each employee, identified as minority or non-minority. Copies of these reports shall be provided at the end of each week to the City and to the Liaison Committee.

* If job is less than three months, prepare for length of job.

VI. If the Contractor shall use any sub contractor on any work performed under this contract, he/she shall Lake affirmative action to negotiate with qualified minority subcontractors. This affirmative action shall cover both pre-bid and post-bid periods. It shall include notification to the State Office of: Minority *Business Assistance* or As designee, while bids are in preparation, of all products, work or services for which the Contractor intends to negotiate bids.

VII. In the employment of journeyman, apprentices, trainees, and advanced trainees, the Contractor shall give preference to citizens of the Commonwealth who have served in the armed forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates, and, secondly to citizens of the Commonwealth generally, and, if such cannot be obtained in sufficient numbers, then to citizens of the United States

VIII. A designee of the City and a designee of the Liaison Committee shall each have the right of access no the Construction site,

IX. **Compliance with Requirements**
The Contractor shall comply with the provisions of Chapter 151B of the Massachusetts General Laws, which are herein incorporated by reference and made as amended by Executive Order 227, and of Chapter 151B as amended, of the Massachusetts General Laws, both *of which* are herein incorporated by reference and made a part of this contract.

X. **Non-Discrimination**
The Contractor, in the performance of all work after award, and prior to completion of the contract work, will not discriminate on the grounds of race, color, religious creed, national origin, age or sex in employment practices, in the selection or retention of sub-contractors, or in the procurement of materials and rentals of equipment.

XI. **Solicitations for sub-Contracts and for the Procurement of Materials and Equipment**
In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under his contract relative to non-discrimination and affirmative action.

XII. **Bidders Certification Requirement**

1. The following certification statement will be inserted in the bid document just above the bidder's signature.

"The bidder hereby certifies he shall comply with tile minority manpower ratio and specific action steps contained in the City of Newton, Massachusetts Supplemental Equal Employment--Opportunity Anti-Discrimination and Affirmative Action Program. The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors and submit to the contracting or, administering agency prior to the performance of any work under said contract a certification by said subcontractor, regardless of tier, that it will comply with the minority manpower ratio and specific affirmative action steps contained in the City of Newton Massachusetts Supplemental Equal Employment Opportunity Anti -Discrimination and Affirmative Action Program.

XIII. **Contractor's Certification**
A Contractor's' certification form must be signed by all successful low bidders prior to award by the City. A Contractor shall not be eligible for award of a contract unless the contractor has executed and submitted the Contractor's Certification, which shall be deemed a part of the resulting contract. (See Attachment B)

XIV. **Subcontractor's Certification**

Prior to the award of any subcontract, regardless of tier, the prospective subcontractor must execute and submit: to the Prime Contractor a subcontractor's certification setting forth the subcontractor's compliance with this program, which shall be deemed a part of the resulting subcontract. (See Attachment C)

XV. Compliance - Information, Reports and Sanctions

1. The Contractor will provide all information and reports Required by the administering department or, the City on instruction issued by either of them and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the City to affect the employment of personnel. This provision shall apply only to information pertinent to the City's supplementary affirmative action contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering department or the City as appropriate and shall set forth what efforts he/she has made to obtain the information.

2. Whenever the administering department, the City, or the Liaison Committee believes the General Contractor or any Subcontractor may not-, be operating in compliance with the terms of this Section, the City directly, or through its designated agent, shall conduct: an appropriate investigation, and may confer with the parties, to determine if such Contractor is operating in compliance with the terms of this Section. If the City or its agent finds the General Contractor or any Subcontractor not in compliance, it shall make a preliminary report on non-compliance, and notify such Contractor in writing of such steps as will in the judgement of the City or its agent bring such Contractor into compliance. In the event. that such Contractor fails or refuses to fully perform such steps, the City shall make a final report of non-compliance, and recommend to the administering department the imposition of one or more of the sanctions listed below. If, however, the City believes the General Contractor or any Subcontractor has taken or is taking every possible measure to achieve compliance, it shall not make a final report of non-compliance. within fourteen days at the receipt of the recommendations of the City, the administering department shall move to impose one or more of the following sanctions, as it may deem appropriate to attain full and effective enforcement:

   (a) The recovery by the administering department from the General Contractor of 1/100 of 11 of the contract award price or $1000 whichever sum is greater, in the nature of liquidated damages or if a Subcontractor is in non-compliance, the recovery by the administering department from the General Contractor, to be assessed by the General Contractor as a back charge against the Subcontractor, of 1/10 of 1% of the sub-contract price, or $400 whichever sum is greater, in the nature of liquidated damages, for each week that such party fails or refuses to comply

   (b) The suspension of any payment of part thereof due under the contract until such time as the General Contractor or any Subcontractor is able to demonstrate his compliance with the terms of the contract;

   (c) The termination, or cancellation, of the contract, in whole or in part, unless the General Contractor or any Subcontractor is able to demonstrate within a specified time his/her compliance with the terms of the City's affirmative action construction contract requirements; OR,

   (d) The denial to the General Contractor or any Subcontractor of the right to participate in any future contracts awarded by the administering department for a period of up to three years.

3. If at any time after the imposition of one or more of the above sanctions (unless the contract. has been terminated), a Contractor is able to demonstrate that he/she is in compliance with this section, he/she may request the City to suspend the sanctions conditionally pending a final determination by the City as to whether the Contractor is in compliance. Upon final determination of the City, the administrating department, based upon the recommendation of the City, shall either lift the sanctions or continue them.

4. Sanctions enumerated under Section XV shall not: be imposed by the City except after the General Contractor or Subcontractor have had an opportunity for full and fair hearing with City. The non-compliance investigation shall be initiated without prior notice to the contractor. Any sanctions to be imposed shall be, _set forth fully and completely in writing, and may then be appealed to t-he City in writing by the Contractor.

.XIV. **Severability**

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court. shall not, affect or impair any of the remaining provisions.

FAIR EMPLOYMENT LAW

The Fair Employment Law declares that it is illegal to discriminate on the basis of race, color, religious creed, national origin, sex, sexual orientation, age, ancestry or disability

IT IS UNLAWFUL:

- to print or circulate any advertisement or use any application form which directly or indirectly specifies any limitation on the basis of race, color, religious creed, national origin, sex, sexual orientation, age, ancestry or disability.
- to discharge or refuse to hire arty individual on file basis of their race, color, religious creed, national origin, sex, sexual orientation, age, ancestry, or disability.
- to discriminate against any individual in matters relating to compensation, terms, conditions, or privileges of employment because of their race, color, religious creed, national origin, sex, sexual orientation, age, ancestry or disability.
- to require a woman to leave her job at some arbitrary stage in her pregnancy or to refuse to let her return to work until a specified time set by the employer.
- to grant a female employee at least eight weeks leave for purposes of childbirth or to treat her absence differently than any other absence due to disability.
- to require an employee to remain at work during any day or part thereof that s/he observes as a religious holiday provided that the employee gives a ten-day notice and the absence does not cause undue hardship to the employer.
- to discharge or refuse to hire any person because of their failure to furnish information concerning admission to a center for the treatment of mentally ill persons.
- to discriminate against a job applicant for failure to furnish information, written or oral, concerning.- A) an arrest, detention or disposition regarding a violation of law in which no conviction resulted; B) a first conviction for any of the following misdemeanors: driving under the influence, simple assault, speeding, minor traffic violations, disturbance of the peace; or C) conviction for a misdemeanor where the date of the conviction or end of period of incarceration, if any, occurred more than five years prior to the employment application, and the applicant has not been convicted of any offense within the five years immediately before the date of application.

RETALIATION

It is illegal to retaliate against any person because s/he has opposed any practices forbidden under this Chapter or because s/he has filed a complaint, testified, or assisted in any proceeding before the Commission. It is also illegal to aid, abet, incite, compel or coerce the doings of any of the acts forbidden under this Chapter or to attempt to do so.

SEXUAL HARASSMENT

151B:1,18 The term "sexual harassment" shall mean sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when (a) submission to or rejection of such advances, requests or conduct is made either explicitly or implicitly a term or condition of employment, or as a basis for employment decisions: (h) such advances,, requests or conduct have the purpose or effect of unreasonably interfering with an individual's work performance by creating an intimidating, hostile, humiliating or sexually offensive work environment.

COMPLAINTS

All complaints must be filed in writing. Information on the filing of complaints can be obtained by contacting the MASSACHUSETTS COMMISSION AGAINST DISCRIMINATION at the following locations:

Boston office:
One Ashburton Place
Room 601
Boston, MA 02108
(617) 727-3990

Springfield office:
436 Dwight Street
Suite 315
Springfield, MA 01103
(4 13) 739-2145

THE MASSACHUSETTS COMMIISSION AGAINST DISCRIMINATION

Attachment B

CITY OF NEWTON

Contractors Certification

A Contractor will not be eligible for award of a contract, unless such contractor has submitted the following certification, which is deemed a part of the resulting contract.

CONTRACTOR'S CERTIFICATION

_____Certifies that:
Contractor's Name

it tends to use the following listed construction trades in the work under the contract

_____ and

2. will comply with the minority manpower ration and specific affirmative action steps contained herein; and

3. will obtain from each of its subcontractors and submit to the contracting or administering agency prior to the award of any subcontract under this contract the subcontractor certification required by these bid conditions

_____
(Signature of authorized representative of Contractor)

Any contract for the provision of goods or services to the City of Newton or any of its departments is subject to the ordinance creating the Human Rights Commission, as it may be amended from Time to Time. Any complaints within the purview shall be forwarded immediately to the contracting agency, and a copy shall be sent to the Human Rights Commission; any complaints received by the contracting agency shall be forwarded to the contractor, and a copy shall be sent to the Human Rights Commission.

Attachment C

CITY OF NEWTON

Subcontractors Certification

Prior to the award of any subcontract, regardless of tier, the prospective subcontractor must execute and submit to the Prime Contractor the following certification, which will be deemed a part of the resulting subcontractor.

SUBCONTRACTOR'S CERTIFICATION

_____Certifies that:
Contractor's Name

it tends to use the following listed construction trades in the work under the contract

_____ and

will comply with the minority manpower ration and specific affirmative action steps contained herein; and

will obtain from each of its subcontractors and submit to the contracting or administering agency prior to the award of any subcontract under this contract the subcontractor certification required by these bid conditions

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

_____
(Signature of authorized representative of Contractor)

In order to ensure that the said subcontractor's certification becomes part of all subcontracts under the prime contract, no subcontract shall be executed until an authorizee representative of the Administrative Agency administering this project has determined in writing, that the said certification has been incorporated in such subcontract, regardless of tier, Any subcontract executed without such written approval shall be void.

Any contract for the provision of goods or services to the City of Newton or any of its departments is subject to the ordinance creating the Human Rights Commission, as it may be amended from Time to Time. Any complaints within the purview shall be forwarded immediately to the contracting agency, and a copy shall be sent to the Human Rights Commission; any complaints received by the contracting agency shall be forwarded to the contractor, and a copy shall be sent to the Human Rights Commission.

END OF SECTION

CITY OF NEWTON

WAGE RATE REQUIREMENTS

1. GENERAL

A. This section summarizes the requirements for the payment of wages to laborers and mechanics employed under the Contract.

B. Other duties and requirements of law which may not be specified in this section apply and are inherently a part of the Contract.

2. WAGE RATES

A. The rate per hour to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the Work shall not be less than the rate of wages in the attached "Minimum Wage Rates" as determined by the Commissioner of Labor and Industries. This schedule shall continue to be the minimum rate of wages for said employees during the life of this Contract.

B. Keep posted on the site a legible copy of said schedule. Keep on file the wage rates and classifications of labor employed on this Work in order that they may be available for inspection by the Owner, Administrator, or the Architect.

C. Apprentices employed pursuant to this determination of wage rates must be registered and approved by the State Apprenticeship Council wherever rates for journeymen or apprentices are not listed.

D. Pay reserve police officers employed on the Work the prevailing rate of wages paid to regular police officers as required by M.G.L. c149, Sec. 34B, as amended. Such police officers shall be covered by Workmen's Compensation Insurance and Employers Liability Insurance by the Contractor.

E. The Contractor and all subcontractors shall, on a weekly basis throughout the term of the contract, provide to the City of Newton certified payroll affidavits verifying compliance with M.G.L. c.149, Sec. 27, 27A and 27B.

F. The Contractor and all subcontractors shall provide a Statement of Compliance within 15 days of the completion of its portion of the work. This statement shall be submitted to the Owner on the form found elsewhere in this section.

G. The Contractor shall maintain accurate and complete records, including payroll records, during the Contract term and for three years thereafter.

END OF SECTION

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

NOTICE TO AWARDING AUTHORITIES

- 'The enclosed wage schedule applies only to the specific project listed at the top and will be updated for any public construction project lasting longer than one (1) year.
- 'You should request an updated wage schedule from the Division of Occupational Safety if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- 'The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- 'Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

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

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

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

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

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

STATEMENT OF COMPLIANCE

_____, 201_____

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 _____

DIVISION OF OCCUPATIONAL SAFETY, 399 WASHINGTON STREET, 5TH FL., BOSTON, MA. 02108

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

JOANNE F. GOLDSTEIN
Secretary of Labor and Workforce Development

GEORGE E. NOEL
Director of Labor

HEATHER E. ROWE
Acting Commissioner of
Division of Occupational Safety

Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
Construction						
(2 AXLE) DRIVER - EQUIPMENT	06/01/2010	$44.930	12/01/2010	$45.530	06/01/2011	$46.280
	12/01/2011	$46.940	06/01/2012	$47.590	12/01/2012	$48.620
(3 AXLE) DRIVER - EQUIPMENT	06/01/2010	$45.000	12/01/2010	$45.600	06/01/2011	$46.350
	12/01/2011	$47.010	06/01/2012	$47.660	12/01/2012	$48.690
(4 & 5 AXLE) DRIVER - EQUIPMENT	06/01/2010	$45.120	12/01/2010	$45.720	06/01/2011	$46.470
	12/01/2011	$47.130	06/01/2012	$47.780	12/01/2012	$48.810
ADS/SUBMERSIBLE PILOT	08/01/2010	$104.640	08/01/2011	$108.760		
AIR TRACK OPERATOR	06/01/2010	$48.850	12/01/2010	$50.100	06/01/2011	$51.100
	12/01/2011	$52.350				
ASBESTOS REMOVER - PIPE / MECH. EQUIPT.	12/01/2009	$40.250				
ASPHALT RAKER	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE	06/01/2010	$59.730	12/01/2010	$60.980		
BACKHOE/FRONT-END LOADER	06/01/2010	$59.730	12/01/2010	$60.980		
BARCO-TYPE JUMPING TAMPER	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
BLOCK PAVER, RAMMER / CURB SETTER	06/01/2010	$48.850	12/01/2010	$50.100	06/01/2011	$51.100
	12/01/2011	$52.350				
BOILER MAKER	01/01/2010	$55.850				

APPRENTICE: BOILERMAKER - Local 29

Ratio	Step	1	2	3	4	5	6	7	8
1:5	%	65.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00

Apprentice wages shall be no less than the following:

Step 1 $42.66/$42.66 $44.54 $44.54 $46.43/$46.43 $48.31/$48.31 $50.20/$50.20 $52.08/$52.08 $53.97

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	08/01/2010	$69.910	02/01/2011	$70.900	08/01/2011	$73.000
	02/01/2012	$73.990				

APPRENTICE: BRICK/PLASTER/CEMENT MASON - Local 3 Newton

Ratio	Step	1	2	3	4	5
1:5	%	50.00	60.00	70.00	80.00	90.00

Apprentice wages shall be no less than the following:

Step 1 $47.31/$51.83/$56.35/$60.87/$65.39

BULLDOZER/GRADER/SCRAPER	06/01/2010	$59.380	12/01/2010	$60.630		
CAISSON & UNDERPINNING BOTTOM MAN	06/01/2010	$49.250	12/01/2010	$50.500	06/01/2011	$51.500
	12/01/2011	$52.750				
CAISSON & UNDERPINNING LABORER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
CAISSON & UNDERPINNING TOP MAN	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 1 of 10**

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY

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Division of Occupational Safety

Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
CARBIDE CORE DRILL OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
CARPENTER	03/01/2010	$54.500	09/01/2010	$55.380	03/01/2011	$56.250
	09/01/2011	$57.380	03/01/2012	$58.500		

APPRENTICE: CARPENTER - Zone 2 Eastern MA

Ratio	Step	1	2	3	4	5	6	7	8
1:5	%	50.00	60.00	70.00	75.00	80.00	80.00	90.00	90.00

Apprentice wages shall be no less than the following:

Step 1$25.15/2$28.32/3$40.27/4$41.84/5$43.01/6$43.01/7$49.76/8$49.76

Classification	Effective Dates and Total Rates					
CEMENT MASONRY/PLASTERING	08/01/2010	$68.210	02/01/2011	$68.980	08/01/2011	$70.600
	02/01/2012	$71.370				
CHAIN SAW OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	06/01/2010	$60.730	12/01/2010	$61.980		
COMPRESSOR OPERATOR	06/01/2010	$48.760	12/01/2010	$49.690		
DELEADER (BRIDGE)	01/01/2010	$63.410				
DEMO: ADZEMAN	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
DEMO: BACKHOE/LOADER/HAMMER OPERATOR	06/01/2010	$49.100	12/01/2010	$50.350	06/01/2011	$51.350
	12/01/2011	$52.600				
DEMO: BURNERS	06/01/2010	$48.850	12/01/2010	$50.100	06/01/2011	$51.100
	12/01/2011	$52.350				
DEMO: CONCRETE CUTTER/SAWYER	06/01/2010	$49.100	12/01/2010	$50.350	06/01/2011	$51.350
	12/01/2011	$52.600				
DEMO: JACKHAMMER OPERATOR	06/01/2010	$48.850	12/01/2010	$50.100	06/01/2011	$51.100
	12/01/2011	$52.350				
DEMO: WRECKING LABORER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
DIRECTIONAL DRILL MACHINE OPERATOR	06/01/2010	$59.380	12/01/2010	$60.630		
DIVER	08/01/2010	$77.440	08/01/2011	$80.190		
DIVER TENDER	08/01/2010	$62.570	08/01/2011	$65.320		
DIVER TENDER (EFFLUENT)	08/01/2010	$82.330	08/01/2011	$86.460		
DIVER/SLURRY (EFFLUENT)	08/01/2010	$104.640	08/01/2011	$108.760		
ELECTRICIAN	03/01/2010	$65.790	09/01/2010	$67.040	03/01/2011	$68.290

APPRENTICE: ELECTRICIAN - Local103

Ratio	Step	1	2	3	4	5	6	7	8	9	10
2:3***	%	40.00	40.00	45.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00

Apprentice wages shall be no less than the following Steps: App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

1$34.88/2$34.88/3$42.31/4$42.31/5$44.45/6$44.58/7$48.72/8$50.85/9$52.99/10$55.12

Classification	Effective Dates and Total Rates					
ELEVATOR CONSTRUCTOR	01/01/2010	$65.190	01/01/2011	$66.690	01/01/2012	$68.190

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 2 of 10**

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY

DEVAL L. PATRICK
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Secretary of Labor and Workforce Development

GEORGE E. NOEL
Director of Labor

HEATHER E. ROWE
Acting Commissioner of
Division of Occupational Safety

Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
APPRENTICE: ELEVATOR CONSTRUCTOR - Local 4						
Ratio Step 1 2 3 4 5						
1:1 % 50.00 55.00 65.00 70.00 80.00						
Apprentice rates shall be no less than the following: Steps 1-2 are 6 mos ; Steps 3-5 are 1 year						
Step 1 $44.47/$46.89/$51.73/$54.17/$58.99						
ELEVATOR CONSTRUCTOR HELPER	01/01/2010	$51.330	01/01/2011	$52.830	01/01/2012	$54.330
FENCE & GUARD RAIL ERECTOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
FIELD ENG. - INST. PERSON (BLDG, SITE, HVY CONST)	05/01/2010	$56.950	11/01/2010	$58.190	05/01/2011	$59.430
FIELD ENG. - ROD PERSON (BLDG, SITE, HVY CONST)	05/01/2010	$41.520	11/01/2010	$42.250	05/01/2011	$42.980
FIELD ENG.-CHIEF OF PARTY (BLDG, SITE, HVY CONST)	05/01/2010	$58.320	11/01/2010	$59.570	05/01/2011	$60.820
FIRE ALARM INSTALLER	03/01/2010	$65.790	09/01/2010	$67.040	03/01/2011	$68.290
FIRE ALARM REPAIR / MAINTENANCE	03/01/2010	$53.800	09/01/2010	$55.050	03/01/2011	$56.300
FIREMAN (ASST. ENGINEER)	06/01/2010	$53.760	12/01/2010	$54.840		
FLAGGER & SIGNALER	06/01/2010	$37.800	12/01/2010	$37.800	06/01/2011	$38.800
	12/01/2011	$38.800				
FLOORCOVERER	03/01/2010	$59.630	09/01/2010	$60.380	03/01/2011	$61.130
	09/01/2011	$62.380	03/01/2012	$63.630		
APPRENTICE: FLOORCOVERER - Local 2168 Zone I						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 85.00						
Apprentice rates shall be no less than the following: Steps are 750 hrs.						
Step 1 $27.35/$29.13/$39.93/$41.71/$45.32/$47.10/$50.69/$52.47						
FORK LIFT/CHERRY PICKER	06/01/2010	$59.730	12/01/2010	$60.980		
GENERATOR/LIGHTING PLANT/HEATERS	06/01/2010	$48.760	12/01/2010	$49.690		
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	01/01/2010	$52.910				
APPRENTICE: GLAZIER - Local 35 Zone 2						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 90.00						
Apprentice wages shall be no less than the following: Steps are 750 hrs.						
Step 1 $23.84/$28.43/$30.31/$32.18/$41.24/$43.13/$45.01/$48.76						
HOISTING ENGINEER/CRANES/GRADALLS	06/01/2010	$59.730	12/01/2010	$60.980		
APPRENTICE: HOIST/PORT. ENG. - Local 4						
Ratio Step 1 2 3 4 5 6 7 8						
1:4 % 55.00 60.00 65.00 70.00 75.00 80.00 85.00 90.00						
Apprentice wages shall be no less than the following:						
Step 1 $30.40/$44.42/$46.33/$48.23/$50.14/$52.07/$53.99/$55.90						
HVAC (DUCTWORK)	08/01/2010	$63.960	02/01/2011	$65.210	08/01/2011	$66.460
	02/01/2012	$67.710	08/01/2012	$68.960	02/01/2013	$70.210

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 3 of 10**

THE COMMONWEALTH OF MASSACHUSETTS
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Acting Commissioner of
Division of Occupational Safety

Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
HVAC (ELECTRICAL CONTROLS)	03/01/2010	$65.790	09/01/2010	$67.040	03/01/2011	$68.290
HVAC (TESTING AND BALANCING - AIR)	08/01/2010	$63.960	02/01/2011	$65.210	08/01/2011	$66.460
	02/01/2012	$67.710	08/01/2012	$68.960	02/01/2013	$70.210
HVAC (TESTING AND BALANCING - WATER)	03/01/2010	$68.730				
HVAC MECHANIC	03/01/2010	$68.730				
HYDRAULIC DRILLS	06/01/2010	$48.850	12/01/2010	$50.100	06/01/2011	$51.100
	12/01/2011	$52.350				
INSULATOR (PIPES & TANKS)	09/01/2009	$59.260	09/01/2010	$61.660		

APPRENTICE: ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Ratio	Step	1	2	3	4
1:4	%	50.00	60.00	70.00	80.00

Apprentice wages shall be no less than the following: Steps are 1 year

Step 1 $36.14/2 $40.76/3 $45.39/4 $50.01

IRONWORKER/WELDER	03/16/2010	$60.940		

APPRENTICE: IRONWORKER - Local 7 Boston

Ratio	Step	1	2	3	4	5	6
**	%	60.00	70.00	75.00	80.00	85.00	90.00

Apprentice wages shall be no less than the following: ** Structural 1:6; Ornamental 1:4

Step 1 $44.82/2 $50.35/3 $52.12/4 $53.88/5 $55.65/6 $57.41

JACKHAMMER & PAVING BREAKER OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
LABORER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				

APPRENTICE: LABORER - Zone 1

Ratio	Step	1	2	3	4
1:5	%	60.00	70.00	80.00	90.00

Apprentice wages shall be no less than the following:

Step 1 $36.18/2 $39.16/3 $42.14/4 $45.12

LABORER: CARPENTER TENDER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
LABORER: CEMENT FINISHER TENDER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
LABORER: MASON TENDER	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
LABORER: MULTI-TRADE TENDER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
LABORER: TREE REMOVER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 4 of 10**

THE COMMONWEALTH OF MASSACHUSETTS
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Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
This classification applies to the wholesale removal of standing trees including all associated trimming of branches and limbs, and applies to the removal of branches at locations not on or around utility lines.						
LASER BEAM OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
MARBLE & TILE FINISHERS	08/01/2010	$58.470	02/01/2011	$59.270	08/01/2011	$60.950
	02/01/2012	$61.740				
APPRENTICE: MARBLE & TILE FINISHER - Local 3 Marble & Tile						
Ratio: 1:3 Step: % 1: 50.00 2: 60.00 3: 70.00 4: 80.00 5: 90.00						
Apprentice wages shall be no less than the following: Steps are 800 hrs.						
Step 1 $41.18/2 $44.63/3 $48.09/4 $51.55/5 $55.01						
MARBLE MASONS,TILELAYERS & TERRAZZO MECH	08/01/2010	$69.950	02/01/2011	$70.940	08/01/2011	$73.040
	02/01/2012	$74.030				
APPRENTICE: MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile						
Ratio: 1:3 Step: % 1: 50.00 2: 60.00 3: 70.00 4: 80.00 5: 90.00						
Apprentice wages shall be no less than the following:						
Step 1 $47.33/2 $51.83/3 $56.38/4 $60.90/5 $65.43						
MECH. SWEEPER OPERATOR (NON-CONSTRUCTION)	07/01/2010	$29.590	07/01/2011	$30.290		
MECH. SWEEPER OPERATOR (ON CONST. SITES)	06/01/2010	$59.380	12/01/2010	$60.630		
MECHANICS MAINTENANCE	06/01/2010	$59.380	12/01/2010	$60.630		
MILLWRIGHT (Zone 1)	04/01/2010	$55.850				
APPRENTICE: MILLWRIGHT - Local 1121 Zone 1						
Ratio: 1:5 Step: % 1: 50.00 2: 55.00 3: 60.00 4: 65.00 5: 70.00 6: 75.00 7: 80.00 8: 85.00						
Apprentice wages shall be no less than the following:						
Step 1 $34.63/2 $36.31/3 $39.44/4 $41.12/5 $44.24/6 $45.94/7 $47.65/8 $49.32						
MORTAR MIXER	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
OILER (OTHER THAN TRUCK CRANES,GRADALLS)	06/01/2010	$42.430	12/01/2010	$43.170		
OILER (TRUCK CRANES, GRADALLS)	06/01/2010	$45.500	12/01/2010	$46.330		
OTHER POWER DRIVEN EQUIPMENT - CLASS II	06/01/2010	$59.380	12/01/2010	$60.630		
PAINTER (BRIDGES/TANKS)	01/01/2010	$63.410				
APPRENTICE: PAINTER Local 35 - BRIDGES/TANKS						
Ratio: 1:1 Step: % 1: 50.00 2: 55.00 3: 60.00 4: 65.00 5: 70.00 6: 75.00 7: 80.00 8: 90.00						
Apprentice wages shall be no less than the following: Steps are 750 hrs.						
Step 1 $29.31/2 $34.43/3 $36.85/4 $39.27/5 $48.89/6 $51.31/7 $53.73/8 $58.57						

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 5 of 10**

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Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2010	$54.310				
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.						
APPRENTICE: PAINTER. Local 35 Zone 2 - Spray/Sandblast - New						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 90.00						
Apprentice wages shall be no less than the following:						
Step 1 $24.74/2 $31.85/3 $33.55/4 $32.24/5 $44.14/6 $54.53/7 $54.73/8 $50.92						
PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2010	$52.370				
APPRENTICE: PAINTER. Local 35 Zone 2 - Spray/Sandblast - Repaint						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 90.00						
Apprentice wages shall be no less than the following:						
Step 1 $23.79/2 $30.78/3 $32.38/4 $33.98/5 $42.78/6 $44.38/7 $54.98/8 $49.17						
PAINTER (TRAFFIC MARKINGS)	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
PAINTER / TAPER (BRUSH, NEW) *	01/01/2010	$52.910				
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.						
APPRENTICE: PAINTER. - Local 35 Zone 2 - BRUSH NEW						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 90.00						
Apprentice wages shall be no less than the following: Steps are 750 hrs.						
Step 1 $23.84/2 $28.43/3 $30.31/4 $32.18/5 $41.24/6 $43.13/7 $54.01/8 $48.76						
PAINTER / TAPER (BRUSH, REPAINT)	01/01/2010	$50.970				
APPRENTICE: PAINTER. Local 35 Zone 2 - BRUSH REPAINT						
Ratio Step 1 2 3 4 5 6 7 8						
1:1 % 50.00 55.00 60.00 65.00 70.00 75.00 80.00 90.00						
Apprentice wages shall be no less than the following: Steps are 750 hrs.						
Step 1 $22.89/2 $27.34/3 $29.14/4 $30.92/5 $39.90/6 $41.68/7 $43.46/8 $47.01						
PANEL & PICKUP TRUCKS DRIVER	06/01/2010	$44.760	12/01/2010	$45.360	06/01/2011	$46.110
	12/01/2011	$46.770	06/01/2012	$47.420	12/01/2012	$48.450
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2010	$62.570	08/01/2011	$65.320		
PILE DRIVER	08/01/2010	$62.570	08/01/2011	$65.320		
APPRENTICE: PILE DRIVER. - Local 56 Zone 1						
Ratio Step 1 2 3 4 5 6 7 8						
1:3 % 60.00 65.00 70.00 75.00 80.00 85.00 90.00 95.00						
Apprentice wages shall be no less than the following:						
Step 1 $45.35/2 $47.21/3 $49.07/4 $50.93/5 $52.79/6 $54.64/7 $56.50/8 $58.36						
PIPEFITTER & STEAMFITTER	03/01/2010	$68.730				

This wage schedule must be posted at the work site in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

Issue Date: 08/25/2010 **Wage Request Number:** 20100825-028 **Page 6 of 10**

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Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
APPRENTICE: PIPEFITTER - Local537						
Ratio Step 1 2 3 4 5						
** % 40.00 45.00 60.00 70.00 80.00						
Apprentice Rates-Step1$33.94/2$43.38/3$50.29/4$54.90/5$59.51 **1:3; 3:5; 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)						
PIPELAYER	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
PLUMBERS & GASFITTERS	03/01/2010	$67.500				
APPRENTICE: PLUMBER - Local12						
Ratio Step 1 2 3 4 5						
** % 35.00 40.00 55.00 65.00 75.00						
Apprentice wages shall be no less than the following: **1:2; 2:4; 3:10; 4:14; 5:19/Steps are 1 yr						
Step 1$30.03/2$32.90/3$41.37/4$47.32/4+wflic$50.20/5$53.07/5+wflic$55.98						
PNEUMATIC CONTROLS (TEMP.)	03/01/2010	$68.730				
PNEUMATIC DRILL/TOOL OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
POWDERMAN & BLASTER	06/01/2010	$49.100	12/01/2010	$50.350	06/01/2011	$51.350
	12/01/2011	$52.600				
POWER SHOVEL/DERRICK/TRENCHING MACHINE	06/01/2010	$59.730	12/01/2010	$60.980		
PUMP OPERATOR (CONCRETE)	06/01/2010	$59.730	12/01/2010	$60.980		
PUMP OPERATOR (DEWATERING, OTHER)	06/01/2010	$48.760	12/01/2010	$49.690		
READY-MIX CONCRETE DRIVER	05/01/2010	$41.080	05/01/2011	$41.690		
RECLAIMERS	06/01/2010	$59.380	12/01/2010	$60.630		
RESIDENTIAL WOOD FRAME CARPENTER **	04/01/2009	$35.620				
** 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.						
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						
Ratio Step 1 2 3 4 5 6 7 8						
1:3 % 40.00 40.00 65.00 70.00 75.00 80.00 85.00 90.00						
Apprentice wages shall be no less than the following:						
Step 1$20.13/2$24.04/3$27.23/4$28.43/5$29.43/6$30.83/7$32.03/8$33.22						
RIDE-ON MOTORIZED BUGGY OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
ROLLER/SPREADER/MULCHING MACHINE	06/01/2010	$59.380	12/01/2010	$60.630		
ROOFER (Inc. Roofer Waterproofing & Roofer Dampproofg)	02/01/2009	$53.860				

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

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Acting Commissioner of
Division of Occupational Safety

Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
APPRENTICE: ROOFER - Local33						
Ratio / Step / 1 / 2 / 3 / 4 / 5						
** / % / 50.00 / 60.00 / 65.00 / 75.00 / 85.00						
**1:5, 2:6-10, thal 10; Roofing: 1:4, then 1:1	Step 1 is 2000 hrs; Steps 2-5 are 1000 hrs.					
Apprentice rates no less than: Step 1$34.48/2$40.84/3$42.58/4$46.02/5$49.30						
SHEET METAL WORKER	08/01/2010	$63.960	02/01/2011	$65.210	08/01/2011	$66.460
	02/01/2012	$67.710	08/01/2012	$68.960	02/01/2013	$70.210
APPRENTICE: SHEET METAL WORKER - Local17-A						
Ratio / Step / 1 / 2 / 3 / 4 / 5 / 6 / 7						
1:4 / % / 40.00 / 45.00 / 50.00 / 60.00 / 65.00 / 75.00 / 85.00						
Apprentice wages shall be no less than the following:	Steps 1-3 are 1 year; Steps 4-7 are 6 mos.					
Step 1$24.84/2$33.33/3$33.95/4$41.20/5$43.83/6$49.08/7$53.88						
SIGN ERECTOR	06/01/2009	$37.780				
APPRENTICE: SIGN ERECTOR - Local35 Zone 2						
Ratio / Step / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9						
1:1 / % / 50.00 / 55.00 / 60.00 / 65.00 / 70.00 / 75.00 / 80.00 / 85.00 / 90.00						
	Steps are 6 mos.					
SLATE / TILE / PRECAST CONCRETE ROOFER	02/01/2009	$54.110				
SPECIALIZED EARTH MOVING EQUIP < 35 TONS	06/01/2010	$45.220	12/01/2010	$45.820	06/01/2011	$46.570
	12/01/2011	$47.230	06/01/2012	$47.880	12/01/2012	$48.910
SPECIALIZED EARTH MOVING EQUIP > 35 TONS	06/01/2010	$45.510	12/01/2010	$46.110	06/01/2011	$46.860
	12/01/2011	$47.520	06/01/2012	$48.170	12/01/2012	$49.200
SPRINKLER FITTER	04/01/2010	$69.550				
APPRENTICE: SPRINKLER FITTER - Local550						
Ratio / Step / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10						
1:1 / % / 40.00 / 45.00 / 50.00 / 55.00 / 60.00 / 65.00 / 70.00 / 75.00 / 80.00 / 85.00						
Apprentice wages shall be no less than the following steps:						
1$35.04/2$37.82/3$40.40/4$43.38/5$46.16/6$48.94/7$51.72/8$54.50/9$57.28/10$60.06						
STEAM BOILER OPERATOR	06/01/2010	$59.380	12/01/2010	$60.630		
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	06/01/2010	$59.380	12/01/2010	$60.630		
TELECOMMUNICATION TECHNICIAN	03/01/2010	$53.800	09/01/2010	$55.050	03/01/2011	$56.300
APPRENTICE: TELECOMMUNICATION TECHNICIAN - Local103						
Ratio / Step / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8						
1:1 / % / 40.00 / 45.00 / 50.00 / 55.00 / 60.00 / 65.00 / 75.00 / 80.00						
Apprentice wages shall be no less than the following:						
Step 1$34.59/2$36.19/3$37.80/4$39.39/5$40.99/6$42.60/7$45.80/8$47.40						
TERRAZZO FINISHERS	08/01/2010	$68.850	02/01/2011	$69.840	08/01/2011	$71.940
	02/01/2012	$72.930				

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Prevailing Wage Rates

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

Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates					
APPRENTICE: TERRAZZO FINISHER - Local 3 Marble & Tile						
Ratio Step 1 2 3 4 5						
1:3 % 50.00 60.00 70.00 80.00 90.00						
Apprentice wages shall be no less than the following: Steps are 800 hrs.						
Step 1 $44.78/2 $51.19/3 $55.41/4 $60.02/5 $64.44						
TEST BORING DRILLER	06/01/2010	$49.500	12/01/2010	$50.750	06/01/2011	$51.750
	12/01/2011	$53.000				
TEST BORING DRILLER HELPER	06/01/2010	$48.220	12/01/2010	$49.470	06/01/2011	$50.470
	12/01/2011	$51.720				
TEST BORING LABORER	06/01/2010	$48.100	12/01/2010	$49.350	06/01/2011	$50.350
	12/01/2011	$51.600				
TRACTORS/PORTABLE STEAM GENERATORS	06/01/2010	$59.380	12/01/2010	$60.630		
TRAILERS FOR EARTH MOVING EQUIPMENT	06/01/2010	$45.800	12/01/2010	$46.400	06/01/2011	$47.150
	12/01/2011	$47.810	06/01/2012	$48.460	12/01/2012	$49.490
TUNNEL WORK - COMPRESSED AIR	06/01/2010	$60.680	12/01/2010	$61.930	06/01/2011	$63.180
	12/01/2011	$64.430				
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	06/01/2010	$62.680	12/01/2010	$63.930	06/01/2011	$65.180
	12/01/2011	$66.430				
TUNNEL WORK - FREE AIR	06/01/2010	$52.750	12/01/2010	$54.000	06/01/2011	$55.250
	12/01/2011	$56.500				
TUNNEL WORK - FREE AIR (HAZ. WASTE)	06/01/2010	$54.750	12/01/2010	$56.000	06/01/2011	$57.250
	12/01/2011	$58.500				
VAC-HAUL	06/01/2010	$45.220	12/01/2010	$45.820	06/01/2011	$46.570
	12/01/2011	$47.230	06/01/2012	$47.880	12/01/2012	$48.910
WAGON DRILL OPERATOR	06/01/2010	$48.350	12/01/2010	$49.600	06/01/2011	$50.600
	12/01/2011	$51.850				
WASTE WATER PUMP OPERATOR	06/01/2010	$59.730	12/01/2010	$60.980		
WATER METER INSTALLER	03/01/2010	$67.500				

This wage schedule must be posted at the work site in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

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Awarding Authority: City of Newton

Contract Number: 11-11 **City/Town:** NEWTON

Description of Work: Re-Bid Williams School Boiler Replacement

Job Location: 141 Grove Street, Newton

Classification	Effective Dates and Total Rates

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, Section 11.

All steps are six months (1000 hours) unless otherwise specified.

* Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof.
** Multiple ratios are listed in the comment field.
*** The job site ratio of 2 apprentices (APP) for every 3 journeymen (JM) is allowed as follows:
1 JM: 1 APP; 2-3 JM: 2 APP; 4-6 JM: 4 APP; 7-9 JM: 6 APP; 10-12 JM: 8 APP; 13-15 JM: 10 APP; etc.
**** The job site ratio of 2 apprentices (APP) for every 3 journeymen (JM) is allowed as follows:
1-2 JM: 1 APP; 3-4 JM: 2 APP; 5 JM: 3 APP; 6-7 JM: 4 APP; 8 JM: 5 APP; etc.

This wage schedule must be posted at the worksite in accordance with M.G.L. c. 149, § 27. Failure of the employer to pay "prevailing wage rates," which are the minimum wage rates listed above, on public works projects is a violation of M.G.L. c. 149, § 27. Employees not receiving such rates should report the violation to the Fair Labor Division of the Office of the Attorney General, 100 Cambridge Street, Boston, MA 02108; Tel: 617-727-3465. Contractors with questions about the wage rates or classifications included on the wage schedules have an affirmative obligation to inquire with DOS at www.mass.gov/dos/pw or at 617-626-6952.

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WEEKLY PAYROLL REPORT FORM

Company Name:

Project Name:

Awarding Auth.:

Work Week Ending:

Prime Contractor

Subcontractor
List Prime Contractor:

Employer Signature:

Print Name & Title:

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

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

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PLANS ARE ONLY AVAILABLE THROUGH THE CITY'S WEBSITE: www.ci.newton.ma.us/bids

DIVISION 1

SECTION 00840

INSURANCE REQUIREMENTS

1.01 GENERAL

A. This section specifies the Owner's insurance requirements and relates to the General Conditions of the Contract for Construction and the Supplement to the Standard Form of Agreement Between Owner and Contractor.

B. Provisions of the General Conditions of the Contract for Construction and Supplement to the Standard Form of Agreement Between Owner and Contractor which are not modified by the following insurance requirements remain in full effect.

C. The Owner, at its own expense, will carry a Builder's Risk endorsement on its property insurance policy. The Builder's Risk endorsement on its property insurance policy. The Builder's Risk endorsement will cover all materials on the project site which may, at the time of any damage, be owned by the Contractor, but which are or will become part of the project.

1.02 INSURANCE REQUIREMENTS

A. The insurance required shall be written for not less than the limits of liability required by law or the following limits, whichever is greater:

State and Federal Workmen's Compensation Statutory
Employer's Liability (Each Accident) ..... $ 500,000
Benefits required by Union Contract ..... As required

GENERAL LIABILITY*

General Liability - Bodily Injury/Death Each Occurrence $1,000,000
General Liability - Bodily Injury Aggregate $3,000,000
General Liability - Property Damage Each Occurrence $1,000,000
General Liability - Property Damage Aggregate $3,000,000

General Liability shall include coverage for the following:

Comprehensive Form
Premises/Operations Liability
Explosion, Collapse and Underground (XCU)
Products/Completed Operations
Contractual Liability
Independent Contractors
Broad Form Property Damage
Personal Injury Including Libel and Slander Coverage
Broad Form CGL Endorsement

AUTOMOBILE LIABILITY**

Comp. Automobile Liability - Bodily Injury Per Person..... $ 1,000,000
Comp. Automobile Liability - Bodily Injury Per Accident ..... $ 1,000,000
Comp. Automobile Liability - Property Damage..... $ 1,000,000

EXCESS LIABILITY (UMBRELLA COVERAGE)

Bodily Injury and Property Damage Combined Each Occurrence ..... $ 2,000,000

Bodily Injury and Property Damage Combined Aggregate..... $ 2,000,000

B. Exclusions: The Owner's property insurance shall not cover tools, equipment, shoring, staging, forms, temporary buildings or other equipment owned or rented by the Contractor, its Subcontractors, or any worker.

C. Insurance Certificates: The Contractor and all subcontractors who are required to provide insurance under the Contract shall provide accurate and bona fide "Certificates of Insurance" issued by a responsible agent of the insurance company.

1. Certificate Content: Such "Certificates of Insurance" shall clearly indicate the insurance coverage provided including all riders and limits specified. Each "Certificate of Insurance" shall be accompanied by a sworn and duly notarized statement from the responsible agent of the insurance company issuing the Certificate clearly stating that all insurance specified and required by the Contract Documents is provided and in force, and also a clear statement of all exceptions and deviations, if any, from the Contract Document insurance requirements.

2. Responsibility: The insurance agent issuing and authorizing the "Certificate of Insurance" shall be responsible and liable for the accuracy and validity of the "Certificate of Insurance". Each insured party shall certify by sworn and duly notarized statement that the "Certificates of Insurance" issued for them are bona fide.

3. Disclaimers Prohibited: "Certificates of Insurance" shall not contain any disclaimers such as: "This Certificate is issued as a matter of information only and confers no rights upon the certificate holder. This Certificate does not amend, extend, or alter the coverage afforded by the policies listed below." Disclaimers are not acceptable.

4. Certificates of Insurance Can Be Relied Upon: Parties receiving "Certificates of Insurance" shall be entitled to rely upon the "Certificates of Insurance" and shall have the right to claim the benefits and protection provided by the insurance as it applies to them.

5. Alternate to "Certificates of Insurance": Instead of providing the "Certificates of Insurance" and the sworn statements required above, the insured may provide bona fide and accurate copies of all insurance policies and riders accompanied by a sworn and duly notarized statement from the insured that the policies, riders, and documents submitted are bona fide and valid, and that parties receiving the insurance documents may rely on the documents as satisfaction of the Contract insurance requirements.

END OF SECTION

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 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.

1.04 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.

1.05 GENERAL DESCRIPTION OF WORK:

The work in general consists of removal of boilers, breeching, valves and related controls, and steam traps throughout the boiler room. The installation of a new dual fuel boiler, gas piping, oil pump set, boiler feed system, breeching, valves and related piping and controls; supply fan and associated controls. The work includes, but is not limited to:

1. Asbestos materials removal
2. Removal of boiler and controls
3. Relocation of oil pump set and controls
4. Removal of breeching serving boiler
5. Removal of boiler feed unit and controls
6. Removal of valves and traps
7. Installation of new boiler
8. Installation of a new breeching to connect to existing chimney
9. Installation of new blow down tank
10. Installation of new steam traps
11. Installation of new boiler feed system and piping
12. Piping Systems including steam, condensate, make-up, boiler feed
13. Insulation on new piping and breeching
14. Electrical wiring connections
15. Cutting and patching

16. Structural supports
17. Testing
18. Pump and Oil Piping
19. Automatic controls
20. Combustion air fans and louver
21. Valves, traps and piping specialties.
22. Electrical connection to new mechanical equipment
23. Air compressor and controls
24. Unit heater and controls

1.06 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 <u>CONTRACT INCLUDES (LIST OF DRAWINGS)</u>

Per the title sheet of the drawing package (9 pages).

01012 <u>ORDER OF AND COMPLETION OF WORK</u>

1.01 Upon the award 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 Fuel oil, temporary lighting, gas and other utilities (except for heating the school) shall be provided by the Contractor, the cost of which is to be included in the Bid Price.

1.03 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.

1.04 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.

1.05 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 "General Specifications")**

01019 **OFFICE (none required)**

01020 **VISITATION TO SITES**

1.01 All bidders shall, before submitting a bid, visit the sites 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 and improperly licensed disposal sites, disposal and transportation permits.

01022 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.

01023 ACCESS TO BUILDING

1.01 The buildings will be opened during regular 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. The building will be occupied throughout construction.

01024 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.

01025 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 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

DIVISION 1

SECTION 01100

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 same 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.

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 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.

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.

1.07 FIRE PROTECTION AND PREVENTION

A. Comply with the following minimum requirements for fire prevention:

1. Provide the services of a City of Newton Firefighter during all welding/cutting operations performed within the school (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. Keep all used paint rags in a can with sufficient water to cover.

6. 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.

7. Ensure that tarpaulins that may be used during construction of work are made of material which is resistant to fire, water, and weather, are U.L. 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.

G. No welding and cutting is permitted during school hours.

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, dustproof coverings as required to prevent the spread of dust beyond the immediate area where work is being performed.

1. No painting during school hours.
2. No cutting, welding, asbestos abatement or demolition during school hours.
3. No rigging of equipment during school hours.
4. No power shutdowns during school hours.

B. Contractor shall cover and protect all school furnishings and equipment in each classroom while work is performed in that classroom.

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 firemen 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 Workingmen's Compensation Insurance and Employer's Liability Insurance, required under the General Contract to cover police and firemen used on the project. Fire watch will be required during demolition of existing feed tank.

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.

B. The Owner will, prior to any such partial occupancy, give notice to the Contractor thereof and such occupancy shall be predicated upon the following items:

1. In the case of partial occupancy prior to the stipulated completed date, the Owner shall secure endorsement from the insurance carrier and consent of the surety permitting occupancy of the building or use of the project during the remaining period of construction.

2. In the case of partial occupancy after the stipulated completion date, the Contractor shall extend all the necessary insurance coverage as stipulated until the date of final acceptance of the project is issued by the Owner. It is further noted that the use and occupancy prior to the formal acceptance does not relieve the Contractor of his responsibility to maintain the insurance coverage as required under the SUPPLEMENTARY CONDITIONS.

3. The one year guarantee period called for in the CONTRACT DOCUMENTS shall not commence until the date of Substantial Completion of all work under the Contract, as determined by the Engineer.

4. The occupancy of the building or any portion thereof by the Owner shall not constitute an acceptance of work not performed in accordance with the CONTRACT DOCUMENTS or relieve the Contractor of liabilities, to perform any work required by the Contract, but not completed at the time of occupancy.

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.

END OF SECTION

DIVISION 1

SECTION 01300
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 <u>must</u> be delivered to the Owner prior to any payment made to the Contractor for that work.

1.05 ASBESTOS

A. Refer to Division 2 - Section 02075 - ASBESTOS ABATEMENT.

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. Note: Boiler room access is limited. Access is via stairs and 3 ft. door only.

a. One (1) existing boiler, piping, supports, insulation and appurtenances, piping, controls and breeching.

b. Oil piping, oil pumps, and appurtenances.

c. Selected steam lines, hot water lines, boiler feed system, condensate returns, makeup water lines and appurtenances.

d. Controls and appurtenances.

e. Piping, controls, insulation and appurtenances.

f. All openings in existing walls, floors, or other areas that are required for the installation of proposed equipment shall be provided by the Contractor.

g. All demolition/removal work shown on the Drawings or specified shall be performed by the Contractor.

END OF SECTION

DIVISION 1

SECTION 01310

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 Supplementary Conditions, Paragraph I: Working Hours. In general, buildings are available Monday through Friday, 7 a.m. to 3 p.m. Additional hours approved by the City and paid for by the contractor should be agreed to by the City of Newton.

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 CONTRACT SCHEDULE

A. Work under this contract shall commence on or about October 1, 2010 with access to the school no later than October 4, 2010.

B. Work under this contract shall be substantially completed no later than December 15, 2010.

C. Heating systems must be operational by December 15, 2010.

D. Work under this contract shall be completed by January 3, 2011.

1.03 LIQUIDATED DAMAGES

A. The work shall be completed on or before said dates. In case the work embraced in this contract shall not have been completed due to the failure of the Contractor to complete the work or any part of the work within the time specified, the Awarding Authority shall recover as liquidated damages $1,000.00 per day for every day beyond the contract completion dates or completion dates as extended in accordance with Article 8.3 of A201-1997.

B. Owner and Contractor recognize that Owner will suffer financial loss if the work is not completed on schedule, thus, such liquidated damages for delay reflect an agreed upon approximation of loss suffered by Owner because of such delay and do not constitute a penalty.

1.04 MILESTONE AND PHASING SCHEDULE AT EACH SCHOOL

M-1	INITIATE CONTRACT	September 17, 2010
M-2	CONTRACT AWARD	September 17, 2010
M-3	ORDER LONG LEAD EQUIPMENT	September 24, 2010
M-4	ACCESS TO SCHOOL – Pre-Construction (Take measurements)	September 24, 2010
M-5	ACCESS TO SCHOOL - Construction (Begin piping, set-up, boiler change over, tank cleaning)	October 1, 2010
M-6	COMPLETE ASBESTOS ABATEMENT Boiler Room	October 8, 2010
M-7	BOILER RIGGED INTO PLACE	November 21, 2010
M-8	BURNER AND MISC. EQUIPMENT INSTALLED	December 1, 2010
M-9	CONTROLS AND WIRING	December 8, 2010
M-10	COMPLETE BOILER INSTALLATION AND START-UP	December 15, 2010
M-11	PROJECT ENTIRE COMPLETION	January 3, 2011

END OF SECTION

SECTION 01400
ALTERNATES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Bidder shall be held fully responsible for examining the scope of the alternates generally defined herein and for recognizing any modifications to his work caused by any Alternate whether or not his particular trade SECTION is mentioned therein.

B. General Bidders shall enter a single amount in the appropriate space provided in the FORM FOR GENERAL BID which total amount shall consist of the amount for all work to be performed.

C. The work of the various trades to be performed under Alternates shall be in strict accordance with the requirements of the particular trade SECTION of the SPECIFICATIONS.

1.02 ALTERNATE NO. 1

A. Demolish existing boiler B-2 and provide new boiler as generally shown on drawings MD2.00 and M2.00.

1.03 ALTERNATE NO. 2

A. Abate all existing breeching, piping and valves, insulation as generally shown on drawings MD2.00 and reinsulate.

END OF SECTION

SECTION 02050

SELECTIVE DEMOLITION

PART 1 — GENERAL

1.01 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.

1.02 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:

a. Equipment, piping, walls, etc. within the existing areas indicated as to be removed.

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 16000, water and gas per 15400/15500 as necessary for demolition as specified by respective trades.

1.03 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 15400 – Plumbing

2. Section 15500 – Heating, Ventilating and Air Conditioning

3. Section 16000 – Electrical

1.04 SUBMITTALS

A. 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.

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 element to 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.

1.01 PART 2 — PRODUCTS

A. Not Used

PART 3 — EXECUTION

3.01 INSPECTION

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.

3.02 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 furniture, 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.

3.03 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 concrete and masonry in sections small enough to preclude any damage to adjacent areas that are to remain intact. Cut concrete and masonry at junctures using power driven masonry saw or hand tools; do not use power driven impact tools.

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. 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.

D. 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.

E. Perform all demolition while ensuring minimum interference with adjacent occupied areas.

F. 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.

G. 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.

H. Promptly repair any damage caused to adjacent facilities or areas that are to remain at no additional cost to the Owner.

I. 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 (boilers, etc.) may be required to be cut into sections and removed in pieces.

J. 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.

K. Equipment to be turned over to the Owner: deliver to a location designated by the Owner, and obtain acknowledgment of receipt in good condition.

L. All equipment, etc., not turned over to the Owner shall become the property of the Contractor, and shall be removed from the site.

M. 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.

N. 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.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.

A. 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.

3.05 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

DIVISION 2

SECTION 02075

ASBESTOS ABATEMENT & RELATED WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

General provisions of the Contract, including General and Supplementary Conditions, apply to the work of each of the Specification Sections.

1.02 PROJECT SCOPE-OF-WORK/ACBM TO BE REMOVED

General: All asbestos abatement work is to be completed in accordance with the requirements set forth herein. The scope-of-work includes the repair and removal, transport, and disposal of designated asbestos-containing building materials (ACBMs or asbestos-containing material, ACM) in the boiler room at the Williams School. All work is to be completed in accordance with the schedules stated herein and as designated by City of Newton (Owner). It is essential that all work be phased and scheduled as required to facilitate Owner operations. All work is to be completed in strict accordance with applicable local, state, and federal codes and regulations and the requirements stated in this specification and Contract Documents.

Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. This specification shall be considered part of the Contract Documents.

Work is to be completed in the below listed work areas. Contractor must confirm all quantities and conditions as necessary to prepare bid and perform the work. ACM removal, packaging, transport and disposal, in accordance with the Contract Documents and Owner Project Manual, includes the following:

Location	Summary of Work
Williams School Boiler Room	Conduct demolition of boilers, breeching, piping, boiler feed, and condensate and remove ACBM gasket and insulation encountered within boiler equipment and boiler room piping, breeching and equipment and boiler base scheduled to be removed.

1.03 WORK SCHEDULES:

All work shall be completed in accordance with the schedule requirements as indicated by the Owner. Unless otherwise stated and authorized in writing by Owner's Representative.

All work shall be strictly coordinated and scheduled by the Contractor as indicated by and cooperation with the Owner and the Owner's Representative as required to facilitate Owner operations and general occupancy of the site. Contractor must provide proposed daily schedules to Owner and Owner's Representative. Adequate advance notice must be provided to Owner and Owner's Representative prior to any schedule changes. Specific phasing requirements are as stated in the Contractor Documents as applicable. No abatement work shall occur while school is occupied.

1.04 CONTRACTOR ESTIMATES

Estimates: Contractor pricing must be based on the Contractor's field measurements and assessment of the conditions and requirements of the Work, in addition to requirements of the Specification. Listings of ACBM and noted conditions for the work areas provided by the Owner are intended for informational purposes to assist the Contractor in the Contractor's delineation of the work. It is the responsibility of the Contractor to verify all such project information as necessary to satisfy the Contractor as to the requirements of the work for each specific phase of the project. The Contractor must notify the Owner's Representative of any conflicting information or clarifications required for the preparation of any bids, estimates, and submittal documentation.

The Contractor is responsible for the removal of all designated ACBM in the areas so designated by the Owner and in the Contract Documents. Except as otherwise noted, ACBM which are located within solid wall, floor, and ceiling cavities shall be considered inaccessible and not within the scope of lump sum work.

1.02 EXISTING CONDITIONS

Prior to commencement of work, inspect areas in which work will be performed. Prepare a listing of damage to structure, surfaces, non-ACM insulations, equipment or surrounding properties that could be misconstrued as damage resulting from the work. Contractor is responsible for all damages to equipment, furnishings, finishes and building surfaces in the work area and adjacent caused by the Contractor during the course of abatement. Use care to prevent damages to existing surfaces during installation of solid barriers, critical barriers and primary isolation barriers. Contractor is responsible for completing all repairs to damaged items/surfaces caused by the work.

1.03 POTENTIAL ASBESTOS HAZARD:

The disturbance or dislocation of asbestos-containing materials may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to workmen and building occupants. Apprize all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures that must be followed.

Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

Complete, and coordinate with Owner as applicable, all communication of hazards in strict accordance with 29 CFR 1926.1101 (k). The contractor shall coordinate with the Owner to review all existing inspection records and testing results as needed. ACBM may also be present in other areas of the adjacent building spaces. Contractor shall review all existing inspection records to obtain information on the exact presence of all ACM.

1.04 CONTRACTOR USE OF PREMISES:

General: The Contractor shall limit his use of the site to the work indicated, so as to allow for Owner operations and general construction activity. Confine operations at the site to the specified work areas of the Specification. Take all precautions necessary to protect the building, any occupants, and surrounding areas from work-related hazards during the construction period. Maintain building and work areas in a safe and structurally sound condition throughout the work. Maintain access to the public and other trades in all areas (for example, stairwell and halls) as indicated herein and as otherwise noted by Owner. Provide additional barriers and site security as needed to accommodate such access.

Install solid barriers to prevent unauthorized access and visibility from adjacent, public or Owner-occupied areas as designated by the Owner and using materials and construction methods approved by the Owner. Contractor shall work in cooperation with, and coordinate all work with, the Owner and Owner's Representative. Areas of the hallway designated by Owner for use as temporary staging areas and waste loadout areas must be established and removed each shift such that the hallway and adjacent areas are cleaned of any debris, materials, waste, and equipment during off-shift, nonworking hours.

1.05 STOP WORK:

If the Owner or the Owner's Representative presents a written or verbal stop work order immediately and automatically stop all work. Do not recommence work until authorized in writing by Owner's Representative.

1.06 PROJECT COORDINATION

A. Administrative and Supervisory Personnel:

Site Supervisor: Provide a full-time Site Supervisor who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Contractor's Representative responsible for compliance with all applicable federal, state and local regulations, particularly those relating to asbestos-containing materials.

. Experience and Training: The Site Supervisor must have completed a course at an EPA Training Center or equivalent certificate course in asbestos abatement procedures, and have had a minimum of five (5) years on-the-job training in asbestos abatement procedures. The Site Supervisor must also have adequate experience working on similar projects.

. Accreditation/Qualifications: The Site Supervisor is to be (1) a Competent Person as required by OSHA in 29 CFR 1926, and (2) accredited and certified in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C; and (3) licensed in accordance with 453 CMR 6.00.

Provide a contract project manager who is experienced in the management and administration of similar asbestos abatement projects. The project manager will serve as the point of contact for all contract administration, off-site communications, scheduling, submittal requirements and other related tasks. The project manager shall have sufficient corporate authority to carry out all such responsibilities.

B. Pre-Construction Conference:

An initial progress meeting, recognized as "Pre-Construction Conference", will be convened by the Owner prior to the start of work for each phase. This meeting will be held to review the scope-of-work, scheduling, coordination, and contractor plan of action and submittals, as applicable.

C. Daily Log:

Daily Log: Maintain at the work area a daily log documenting the dates and time of but not limited to, the following items:

. Visitations; authorized and unauthorized
. Personnel entering and leaving the work area (name, certification, expirations)
. Special or unusual events, i.e. barrier breaching, equipment failures, accidents
. Documentation of (1) daily inspections and test results, (2) removal of any sheet plastic barriers, (3) inspections prior to application of encapsulation, enclosure or any other operation that will conceal the condition of ACMs or the substrate from which such materials have been removed, (4) removal of waste materials from work area and site, including exact number of waste bags/containers, (5) decontamination of work area and equipment, and (6) final inspection/air test results.

1.10 STANDARDS

Applicability of Standards: It is the Contractor's responsibility to complete all work in accordance with (or exceeding) all applicable industry standards and guidelines. Except where Contract Documents include more stringent requirements, all applicable construction industry standards have the same force and effect as if bound or copied directly into Contract Documents. Standards are made a part of the Contract Documents by reference. Where compliance with an industry standard is required, comply with the most current standards in effect as of date of Contract Documents.

Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer to the Owner's Representative any requirements that are different or conflicting; outline the more stringent requirement before proceeding.

Comply with applicable standards including, but not limited to, American National Standards Institute (ANSI) standards and American Society for Testing and Materials (ASTM) standards.

1.07 CODES, REGULATIONS, AND STANDARDS - ASBESTOS ABATEMENT

Adhere to work practices and procedures set forth in applicable codes, regulations and standards. Obtain permits, licenses, inspections, and similar documentation, as well as payments and similar requirements associated with codes, regulations, and standards.

The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors.

. All work performed under this contract shall comply with applicable provisions, including most current versions, and not limited to the listed codes and regulations.

Federal Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, including but not limited to:

Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules
Title 29, Part 1910, Section 1001 and Part 1926, of the Code of Federal Regulations

Respiratory Protection; Title 29, Part 1910
Section 134 of the Code of Federal Regulations

Access to Employee Exposure and Medical Records
Title 29, Part 1910, Section 2 of the CFR

Construction Industry
Title 29, Part 1926, of the Code of Federal Regulations

Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, Section 145 of the CFR

Hazard Communication
Title 29, Part 1910, Section 1200 of the CFR

DOT: U. S. Department of Transportation, including but not limited to:

Hazardous Material Regulations
Title 29, Part 171-180 Code of Federal Regulations

EPA: U. S. Environmental Protection Agency (EPA), including but not limited to:

Asbestos Abatement Projects; Worker Protection Rule
Title 40 Part 763, Sub-part G of the Code of Federal Regulations

Asbestos School Hazard Abatement Reauthorization Act (ASHARA)
Training Requirements of (AHERA) Regulation
Asbestos Containing Materials in Schools Final Rule & Notice
Title 40, Part 763, Sub-part E, Code of Federal Regulations

Asbestos Hazard Emergency Response Act (AHERA) Regulation
Asbestos Containing Materials in Schools Final Rule & Notice
Title 40, Part 763, Sub-part E of the Code of Federal Regulations

National Emission Standard for Hazardous Air Pollutants (NESHAPS)
National Emission Standard for Asbestos, Title 40, Part 61, Sub-part A,
and Sub-part M (Revised Sub-part B) of the Code of Federal Regulations

Massachusetts State Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

- Department of Labor ad Workforce Development, Revised 453 CMR 6.00
- Department of Environmental Protection, 310 CMR 7.00, 7.09, 7.15
- Department of Environmental Protection 4.10(2)(c); 7.15: U Asbestos
- Most current revisions, memos, guidelines and policy statements

Local Requirements: Abide by all local requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials. In addition, comply with all applicable Owner terms and conditions, asbestos policies and guidelines, and contract requirements.

1.08 DEFINITIONS

A. General Definitions

General: Definitions contained in this Article are not necessarily complete, but are general to the extent that they are not defined more explicitly elsewhere in the Contract Documents.

Indicated: This term refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Owner's representative", "requested by the "Owner's Representative", and similar phrases. However, no implied meaning shall be interpreted to extend the Owner's Representative's responsibility into the Contractor's area of construction supervision.

Approve: The term "approved," where used in conjunction with the Owner's Representative's action on the Contractor's submittals, applications, and requests, is limited to the responsibilities and duties of the Owner's Representative as indicated in the Contract Documents. Such approval or acceptances do not express or claim any certification of completeness, compliance, or approval of programs and documentation, including but not limited to review of analytical results, historical information, and interpretations. Such approval shall not release the Contractor from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.

Regulation: The term "Regulations" includes laws, statutes, ordinances and lawful orders issued by authorities having jurisdiction, as well as rules, conventions and agreements within the construction industry that control performance of the Work, whether they are lawfully imposed by authorities having jurisdiction or not.

Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."

Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

Installer: An "Installer" is an entity engaged by the Contractor, either as an employee, subcontractor or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

The term "experienced," when used with the term "Installer" means having a minimum of 5 previous projects similar in size and scope to this project, and familiar with the precautions required, and has complied with requirements of the authority having jurisdiction.
Project Site is the space available to the Contractor for performance of the work, either exclusively or in conjunction with others performing other construction as part of the project.

Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.

Owner's Representative: This is the entity employed or engaged as the Owner's Representative as described in the Contract Documents. All references to Owner's Consultant, Air Monitoring Consultant, or Consultant in the Contract Documents in all cases refer to the Owner's Representative. The Owner's Representative will represent the Owner during construction and until final payment is due. The Owner's Representative may also constitute other persons representing the Owner, other than the air monitoring consultant or consultant, as indicated by the Owner. The Owner's instructions to the Contractor will be made directly to the Contractor or forwarded through the Owner's Representative.

Site Supervisor: This is the Contractor's Representative at the work site. This person will be the Competent Person required by OSHA in 29 CFR 1926 and Site Supervisor/Foreman as required by the State of Massachusetts. Provide licensed supervisor at each individual work site during work.

B. Definitions - Asbestos Abatement:

Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).

Adequately Wet: Means sufficiently mix or penetrate with liquid to prevent the release of particulate. If visible emissions are observed coming from the asbestos-containing material, then that material has not been adequately wetted. The absence of visible emissions is not sufficient evidence, or measure, of a material being adequately wet.

Aerosol: A system consisting of particles, solid or liquid, suspended in air.
Air Monitoring: The process of measuring the fiber content of a specific volume of air.

Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.

Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

Asbestos-Containing Material (ACM): Any material containing more than 1% of asbestos of any type or mixture of types.

Asbestos-Containing Building Material (ACBM): Surfacing ACM, thermal system insulation ACM, or misc. ACM in or on interior structure or other parts of a building.

Asbestos-Containing Waste Material: Any material that is or is suspected of being or any material contaminated with an asbestos-containing material that is to be removed from a work area for disposal.

Asbestos debris: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.
Authorized Visitor: The Owner, the Owner's Representative, testing lab personnel, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.

Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

Category I Non-Friable ACM: means ACM packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1% asbestos. Also see definition for Regulated ACM.

Category II Non-Friable ACM: means any non-friable ACM, except for Category I Non-Friable ACM.

Ceiling Concentration: The concentration of airborne substance that shall not be exceeded.

Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.

Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

Disposal Bag: A properly labeled 6-mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.

Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

-Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

-Penetrating encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

-Removal encapsulant: a penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos-containing materials rather than for in situ encapsulation.

Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.

Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

Excursion Limit: Ensure that no employee is exposed to airborne concentrations of asbestos in excess of 1.0 fibers per cubic centimeter of air (1.0 f/cc) as averaged over a sampling period of thirty (30) minutes, as determined by PCM analysis in accordance with NIOSH Method 7400 and as indicated in 29 CFR Part 1926. Also referred to as the short-term exposure limit, (STEL).

Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.

Friable Asbestos Material: Material that contains more than 1.0% asbestos and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. This also includes materials which, when subjected to removal methods and other disturbances, may release fibers and dust due to the abatement actions.

Glovebags: Provide glovebags for removal of pipe insulation in accordance with 29 CFR Part 1926.

HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

High-efficiency particulate air filter: (HEPA) refers to a filtering system capable of trapping and retaining 99.97 percent of all monodispersed particles 0.3 um in diameter or larger.

Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

Permissible exposure limit (PEL): the Contractor shall ensure that no employee is exposed to an airborne fiber concentration of asbestos in excess of 0.1 f/cc of air as an eight (8) hour time-weighted average (TWA) in accordance with 29 CFR Part 1926.

Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.

Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

Regulated ACM (RACM): RACM means friable ACM, Category I Non-friable ACM that has been rendered friable, Category I ACM that will be or has been subjected to sanding, cutting, grinding, or abrading (abrasive action), or Category II Non-friable ACM that has a high probability of becoming, or has become, crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of renovation or demolition operations. Grinding means breaking into small pieces or fragments.

Repair: Returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

Visible Emissions: Any emissions, coming from RACM, ACM, or ACM waste material, which is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

Waste Shipment Record: Means the shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of ACM waste.

Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

1.09 NOTICES:

A. U.S. Environmental Protection Agency

Send proper written notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61, Subpart M) to the regional Asbestos NESHAPS Contact - Reno/Demo Clerk - at least 10 working days prior to beginning any work which will directly or indirectly result in disturbance of asbestos-containing materials. Post notifications at job site.

B. State and Local Agencies:

Send written notification as required by state and local regulations prior to beginning any work on asbestos-containing materials. At least 10 working days prior to the start of work, submit appropriate notification to the Commonwealth of Massachusetts in accordance with 310 CMR 7.15 and 453 CMR 6.12. Post notifications at job site.

Notify all local emergency agencies of the abatement work to be completed as required. Obtain all necessary building permits as required.

C. Permits:

All asbestos containing waste is to be transported by an entity maintaining a current "DOT Common Hauler Permit" specifically for asbestos-containing materials, as required for transporting of waste asbestos-containing materials to a disposal site.

D. Licenses:

Maintain current licenses as required by applicable state and local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract. Post all worker licenses at work area entrance.

E. Posting and Filing of Regulations:

Posting and Filing of Regulations: Post all notices required by applicable federal, state and local regulations. Maintain at least one (1) copy of applicable federal, state and local regulations and standards at each job site. Post copies of the specification at the job site.

1.10 SUBMITTAL REQUIREMENTS

A. Submittal Schedule:

Submittals will be provided by the Contractor and as specified herein including (1) Preconstruction Submittal Documentation prior to start of work and (2) Project Closeout Submittals within 25 days upon completion of on-site work. Submit ongoing submittals as required herein and as specified by the Owner's Representative. Ongoing submittals will also be submitted as required for the Pre-construction and Closeouts and may not be limited to:

- Schedule updating or modifications as needed, including description and explanations as applicable.
- Revise proposed methods of work procedures as required. Requests for revisions in work procedures must be approved by the Owner's Representative.
- Updated notifications and permitting.

Provide at the job site a copy of all current submittal packages and related documentation.

B. Submittal Preparation

Package and furnish each submittal appropriately and include statements detailing minor variations and limitations. Include Contractor's certification that the submittal information complies with the Contract Document and Specification requirements. Two complete copies of each submittal package shall be furnished to the Owner in accordance with the schedules stated herein.

Submittal packages shall be in a neat and orderly fashion, will include an index, and shall be compiled in the order requested herein. Clearly mark and label all sections of the submittal documents.

Do not include, as part of the Submittal Package required herein, other documents not specifically detailed herein. Additional submittal documentation to be provided by the Contractor as the Contractor deems appropriate shall be submitted as a separate supplemental submittal package and marked as such.

Submittal packages that do not meet the requirements herein may not be accepted and will be returned to the Contractor for re-submission.

By "approval" or acceptance of submittals, Owner and Owner's Representative(s) do not express or claim any certification of completeness, compliance, or approval of programs and documentation, not limited to review of analytical results, historical information, and interpretations.

Contractor is solely responsible for compliance with Specification and regulatory requirements associated with the work and submittal documentation.

C. Preconstruction Submittal Documentation:

Provide the following Preconstruction Submittal Documentation:

. Notifications: Copies of dated EPA, State, and local notifications.

. Waste Hauler and Landfill Permits and notifications. Submit names, address, and licenses for the waste hauler and disposal facilities.

. Names, addresses, experience, and references for any subcontractors the Contractor proposes to utilize for Work. State if any subcontractor asbestos workers or supervisors are to be used or whether only Contractor employees.

. Names and 24-hour phone numbers/pagers for Project Manager and other key personnel for the Contractor.

. List of personnel to be on-site. Copies of all company, supervisor, and worker licenses and certifications required and in accordance with this Specification. Copies of current training certificates for workers and supervisors.

. Report from Medical Examination: conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area.

. Notarized Certifications: Submit certification signed by an officer of the abatement contracting firm and notarized that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926. Certify the dates for primary and secondary HEPA filter changes for neg. air units.

. Respiratory Protection Schedule: Submit level of respiratory protection intended for each operation required by the project. Include supporting documentation of previous exposure monitoring on a sufficient number similar project and operations in accordance with OSHA requirements.

. Respiratory Protection Program: Submit Contractor's written respiratory protection program manual as required by OSHA 1926.

. Material Safety Data Sheets: for all materials to be used on-site not limited to encapsulants, spray adhesives, etc. Note: It is Contractor's responsibility to notify other contractors in accordance with applicable OSHA regulations.

. Contingency Plan: Prepare a site specific contingency plan for emergencies including fire, accident, power failure, pressure differential system failure, supplied air system failure, or any other event that may require modification or abridgement of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede

safe exiting or providing of adequate medical attention in the event of an emergency. The emergency contingency plan must be in accordance (meet or exceed the requirements of) with applicable OSHA requirements. Prepare and submit site specific confined space program and lockout-tagout plan in accordance with OSHA requirements.

. Other submittals required by the Contract Documents or as indicated by the Owner, including but not limited to copy of Contractor's Confined Space Program and confined space training records (submit with bid also).

D. Closeout Submittals

Submit all documents in accordance with Owner's Project Manual. In addition, the following Closeout Submittals will be provided upon substantial completion and prior to final completion of each phase of work.

. Copies of daily logs in accordance with this specification; Copies of analytical results and calculations for all air sampling completed by the Contractor during the project.

. A copy of each waste manifest and chain-of-custody form, signed by the transporter and disposal facility operator, indicating that waste was packaged and disposed of properly. Include a description of any temporary storage facilities used including, dates, times, and locations of temporary storage. Note: In accordance with NESHAPS, submit all waste manifest documentation within 35 days from transport of waste from the site (provide interim submittals during the work as needed to comply with federal regulations).

. Copy of updated Pre-construction Submittals for the work. Do not submit personnel training and licensing documentation (other than daily log information) unless the information is not included in the original Preconstruction Submittal Documentation.

1.11 AIR MONITORING:

A. Area Monitoring

Work Area Isolation: The purpose of the Owner's air monitoring is to aid in the detection of faults in the work area isolation such as:

. Contamination of areas outside of the work area isolation barriers
. Failure of filtration or rupture in the differential pressure system
. Contamination of air outside the building envelop with airborne asbestos fibers.

Should any of the above occur immediately cease asbestos abatement activities until the fault is corrected. Do not recommence work until authorized by the Owner's Representative.

The Owner may monitor airborne fiber counts in the Work Area. The purpose of this air monitoring will be to detect airborne asbestos concentrations that may challenge the ability of the Work Area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers. Air monitoring will be performed by persons licensed and trained in accordance with 453 CMR 6.00.

B. Clearance Air Monitoring

Work Area Clearance: To determine if the elevated airborne fiber counts encountered during abatement operations have been reduced to an acceptable level, the Owner will sample and analyze air per applicable regulations and this specification.

C. Stop Action Levels:

Inside Work Area: Maintain an average airborne count in the Work Area of less than 0.20 fibers per cubic centimeter. If the fiber counts rise above this figure for any sample taken, revise work procedures to lower fiber counts. In this event, stop all work, leave pressure differential system in operation, and coordinate with the Owner's Representative as needed.

Outside Work Area: If any air sample taken outside of the Work Area exceeds the base line concentration levels, immediately and automatically stop all work except corrective action.

If it is determined by the Owner's Representative that the high reading was the result of a failure of Work Area isolation measures initiate the following actions:

- Immediately erect new critical barriers as set forth herein to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (eg. wall, ceiling, floor).
- Decontaminate the affected area in accordance with the procedures stated herein.
- Require that respiratory protection as set forth herein is worn in affected area until area is cleared for re-occupancy in accordance with the work area clearance requirements.
- Leave Critical Barriers in place until completion of work and insure that the operation of the pressure differential system in the Work Area results in a flow of air from the balance of the building into the affected area.
- If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a decontamination facility consisting of a Shower Room and Changing Room as set forth herein at entry point to affected area.
- After Certification of Visual Inspection in the Work Area remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area.

If the high reading was the result of other causes initiate corrective action as determined by the Owner's Representative.

Effect on Contract Sum: Complete corrective work with no change in the Contract Sum if high airborne fiber counts were caused by Contractor's activities. The Contract Sum and schedule will be adjusted for additional work caused by high airborne fiber counts beyond the Contractor's control.

D. Analytical Methods:

The Owner reserves the right to use either phase contrast microscopy (PCM) and/or transmission electron microscopy (TEM) to analyze air samples. PCM analysis will be performed using the NIOSH 7400 method at the job site or at an off-site laboratory. PCM or TEM will be used, as the Owner deems necessary and for analysis of samples collected for air clearance purposes. All TEM analysis will be performed using the analysis method set forth in the AHERA regulation 40 CFR Part 763 Append. A.

E. Schedule of Air Samples:

Prior to the start of work: The Owner may collect air samples to establish a base line before start of work. Base line is an action level expressed in fibers per cubic centimeter that is twenty-five percent greater than the largest of the following:

- Average of the PCM samples collected outside each Work Area
- Average of the PCM samples collected outside the building
- 0.01 fibers per cubic centimeter

Daily: From start of work involving Temporary Enclosures through the work of Project Decontamination, the Owner may be collecting samples on a regular basis. Sampling will be completed inside and outside of the work area.

- At HEPA exhaust areas
- Non work-area portions of the building adjacent to Critical Barriers
- At entrance to the Decontamination Unit Clean Room
- At least one sample outside the building
- Adjacent occupied areas of the building

Clearances: See the Air Clearance Requirements.

F. Laboratory Testing:

The services of a testing laboratory will be employed by the Owner to perform laboratory analyses of the air samples. Samples will be sent overnight on a daily basis, so that verbal reports on air samples (PCM analysis) can be obtained within 24 hours. The Contractor will have access to all air monitoring tests and results. Results of all air monitoring tests will be available at the job site on a daily basis. Also see the requirements for air clearance testing. TEM sample analysis may take longer than 24 hours.

G. OSHA Monitoring and Additional Testing:

Additional Testing: The Contractor may conduct his own air monitoring and laboratory testing. If he elects to do this the cost of such air monitoring and laboratory testing shall be at no additional cost to the Owner.

OSHA Compliance Monitoring: Contractor must provide for collection and laboratory analysis services of Contractor's OSHA personal exposure samples, including daily TWA and STEL monitoring.

1.12 TEMPORARY FACILITIES

General: Coordinate with Owner for temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the work. Owner must approve all connections to utilities and components.

A. Water Service:

Temporary Water Service Connection: All connections to the Owner's water system shall include back-flow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves, on fresh water supply lines outside the work area only, shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.

Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.

Hot Water: may be secured from the building hot water system, provided back-flow protection is installed at point of connection as described in this section under Temporary Water Service connection, and if authorized in writing by the Owner.

B. Electrical Service:

General: Comply with applicable OSHA, NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service. Provide temporary power panels and extensions as required.

Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.

Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work. Provide sufficient power cords to complete the Work and for the Owner's Representative to use as required for the performance of air monitoring and clearance testing.

Lamps and Light Fixtures: Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

Temporary Power: Provide service to Decontamination Unit sub-panel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the buildings main distribution panel. Sub-panel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.

Voltage Differences: Provide identification warning signs at power outlets that are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.

C. First Aid:

First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

D. Fire Extinguishers:

Fire Extinguishers: Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide sufficient number of type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

E. Execution

General: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work. Coordinate all such work with the Owner.

- Require that tradesmen be licensed as required by local authorities.
- Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

1.13 TEMPORARY PRESSURE DIFFERENTIAL AND AIR CIRCULATION SYSTEM

A. Monitoring

Continuously monitor and record the pressure differential between the Work Area and the building outside of the Work Area. Maintain accurate records of time and locations of testing on-site and in daily logs.

B. HEPA Filtered Fan Units:

Supply the required number of HEPA filtered fan units to the site in accordance with these specifications. Units must meet the requirements of all applicable regulations and standards. Provide certification of filter change dates. Also see applicable Division 2 Specification Sections.

1.14 WORKER PROTECTION

Comply with respiratory protection requirements as specified in this specification and applicable regulations. Provide worker protection as required by the most stringent OSHA and/or EPA regulations and industry standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.

A. Worker Training:

AHERA Accreditation: All workers are to be accredited as Abatement Workers as required by the AHERA regulation 40 CFR 763 Appendix C to Subpart E, April 30, 1987. All training must be current. Workers that have training that expires during the work must either renew the training or must not be allowed to continue work until refresher training certification is provided.

All removal of thermal systems insulation is OSHA Class 1 asbestos work and shall be completed in strict accordance with 29 CFR Part 1926.1101. Recent EPA regulations and interpretations of certain nonfriable ACBM, such as floor tile and mastic, define it as Category I nonfriable ACM. However, Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading is defined as Regulated ACM. The EPA NESHAPs regulation defines grinding as breaking into small pieces. In addition, OSHA defines ACM flooring abatement as Class II asbestos work. As such all flooring work must be completed in accordance with 29 CFR 1926.1101.

Train, in accordance with NESHAPs and 29 CFR 1926, all supervisors and workers in the dangers inherent in handling asbestos and breathing asbestos dust, in proper work procedures and personal and area protective measures, confined space, and other hazards anticipated during the work. All workers and supervisors must be licensed and certified as required by453 CMR 6.00 and other applicable State regulations. All workers must have adequate experience completing similar projects in accordance with Massachusetts and federal rules and regulations.

Train all workers in accordance with 29 CFR Part 1926 on the work place hazards present at the site, including but not limited to confined space entry, lock-out/tag-out, hazard communication, fall hazards, and other general construction hazards anticipated for the work.

B. Medical Examinations:

Provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 f/cc or greater for an 8 hour Time Weighted Average. In the absence of specific airborne fiber data provide medical examinations for all workers who will enter the Work Area for any reason. Examination shall at a minimum meet OSHA requirements as set forth in 29 CFR 1926 and 29 CFR 1910.20. In addition, provide an evaluation of the individuals ability to work in environments capable of producing heat stress in the worker.

C. Protective Clothing:

Coveralls: Provide cloth full-body coveralls and hats, require that they be worn by all workers in the Work Area. Require that workers change out of coverall in the Equipment Room of the Personnel Decontamination Unit. Dispose of coverall as asbestos waste at completion of all work.

Other: Provide other personal protective equipment as required by OSHA regulations and industry standards, not limited to: hard hats, eye protectives (goggles), gloves, fall safety, footwear, and confined space entry protection.

D. Entering Work Area:

Each time Work Area is entered, remove all street clothes in the changing (clean) room of the personnel decontamination unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots. Only properly licensed/certified personnel shall enter the decontamination unit and work area. All personnel entering the work area must post their State license at the decontamination unit entrance.

E. Decontamination Procedures:

Require all workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:

- HEPA vacuum all gross debris from the protective clothing prior to entering the equipment room of the decontamination unit. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
- Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
- Carefully wash facepiece of respirator inside and out. Each worker leaving the work area must shower completely with soap and water. Rinse thoroughly. Proceed from shower to clean room and change into street clothes or into new disposable work items.

F. Within Work Area:

Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. Maintain proper use of personnel protective equipment.

G. Respiratory Protection:

Provide sufficient respiratory protection in accordance with applicable OSHA requirements in addition to ANSI, NIOSH, and MSHA standards. Select proper level of protection based on personnel exposure monitoring and the applicable OSHA Permissible Exposure Limits.

Instruct and train each worker involved in asbestos abatement or maintenance and repair of asbestos-containing materials in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the Work Area from the start of any operation which may cause airborne asbestos fibers until the Work Area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered and as required for other toxic or oxygen-deficient situations encountered.

Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, meet the more stringent requirement.

OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910, Section 1001 and Section 1910.134. 29 CFR 1926.

CGA - Compressed Gas Association, Inc., New York, Pamphlet CGA G-7,"Compressed Air for Human Respiration", and Specification CGA G-7.1 "Commodity Specification for Air".

ANSI - American National Standard Practices for Respiratory Protection, ANSI Z88.2-1992, and most current revisions.

NIOSH - National Institute for Occupational Safety and Health

MSHA - Mine Safety and Health Administration

Respiratory Protection Program: Comply with ANSI Z88.2 - 1992 (and most current revisions) "Practices for Respiratory Protection" and OSHA 29 CFR 1910 and 1926. Require that respiratory protection be used at all times that there is any possibility of disturbance of asbestos-containing materials whether intentional or accidental.

Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, until the area has been cleared for re-occupancy.

Regardless of Airborne Fiber Levels: The minimum level of respiratory protection used must be half-face negative pressure respirator with high efficiency filters during pre-cleaning and abatement of nonfriable ACBM and PAPR's during abatement of friable ACBM. Provide and complete all necessary fit testing for respiratory protection in strict accordance with applicable OSHA regulations.

In the event that applicable OSHA PEL's (8-hour TWA and 30-minute STEL) are exceeded, stop work. Do not recommence work until work procedures, including use of engineering controls, are modified to maintain exposures within the acceptable PEL's.

1.15 TEMPORARY ENCLOSURES

Work areas are to be considered contaminated during the work and shall be completely isolated from other parts of the building such that asbestos fibers cannot pass through or beyond the perimeters of the work area and into non work areas. Should areas beyond the work area become contaminated with asbestos as a result of the Contractor's work, the Contractor shall be responsible for cleaning non-work areas as required. All costs including cleaning, decontaminating, monitoring and testing shall be borne by the contractor.

Contractor shall construct temporary containment enclosures in each work area as required in the Contract Documents and as required by the Owner. Prior to proceeding with work of each of the following Specification Sections, coordinate and complete inspections of the work in progress with the Owner's Representative as indicated and requested by the Owner's Representative. Proceed with work sequentially as listed or indicated.

Prior to conducting pre-cleaning work, completely isolate the Work Area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the Work Area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the decontamination and cleaning procedures indicated in this Specification. Perform all such required cleaning or decontamination at no additional cost to owner.

Place all tools, scaffolding, staging, etc. necessary for the work in the area to be isolated prior to completion of Work Area isolation. The Owner will remove of all uncontaminated, non-fixed equipment, furniture, and other items from the Work Areas. Disable ventilating systems or any other system bringing air into or out of the Work Area. Disable system by disconnecting wires, removing circuit breakers, by lockable switch or other positive means that will prevent accidental premature restarting of equipment.

Complete all lock-out and tag-out of power and air handling systems to, and within, the Work Area. Coordinate all lock-out and tag-out with the Owner. Provide lock-out and tag-out in strict accordance of applicable OSHA regulations. Complete lock-out and tagging of all other equipment and systems as needed to complete the work in a safe manner. Coordinate with Owner and local fire department authorities the handling of heat and smoke detectors in the work areas, including sealing of detectors during work and removal of seals at the completion of work or shifts.

1.16 REGULATED ACM

All ACM (and ACBM) to be removed during the Work of the Contract Documents shall be handled as Regulated ACM (RACM). This is based on the types of ACM present, conditions of the material, anticipated impact of removal and decontamination methods, and other related conditions.

PART 2 - PRODUCTS

2.01 RELATED DOCUMENTS

General provisions of the Contract, including General and Supplementary Conditions, apply to the work of each of the Specification Sections.

2.02 PRODUCTS

Provide new or used materials and equipment that are undamaged and in serviceable condition. Provide only materials and equipment that are recognized as being suitable for the intended use and in strict compliance with appropriate standards. Do not bring products, materials, and equipment to the Owner's facility that are damaged or contain construction or potential contaminated debris.

Warning Signs, Caution Signs and Demarcation: Provide all demarcation, warning signs, caution signs, and other postings required for the work and in accordance with State and federal codes and regulations.

Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, in 6.0-mil and 10.0-mil thickness, clear or black as indicated. Sheeting must be fire retardant and approved by Owner.

Duct Tape: Provide heavy-duty industrial grade duct tape in 3" widths with an adhesive that is formulated to stick aggressively to sheet polyethylene.

Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

Foam Pack: Provide foam pack for sealing small crevices and cracks at critical barriers as required. All foam pack must be approved by the Owner and local authorities, not limited to the Fire Department.

Scaffolding: Provide all scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions.

-Equip rungs of all metal ladders, etc. with an abrasive non-slip surface.
-Provide a nonskid surface on all scaffold surfaces subject to foot traffic.

First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.

Fire Extinguishers: Provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case, in all areas affected by work.

Wetting Materials: For wetting prior to disturbance of Asbestos-Containing Materials use either amended water or a removal encapsulant:

. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of ACM. Use a material that results in wetting of the ACM and retardation of fiber release during disturbance of the material

equal to or greater than that provided by water amended. Assure all encapsulant materials are compatible with replacement materials prior to application.

Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags labeled as required by applicable sections of this Specification and federal and state regulations.

Fiberboard Drums of Equivalent: Provide sufficient quantity of fiberboard drums or equivalent (as determined by Owner Representative) for packaging of wire mesh and other contaminated materials with sharp or rough edges.

Disposal Bag/Container Labels and Signs: Provide leak-tight waste bags or containers for disposal of asbestos-containing materials with labels in accordance with OSHA, EPA, and the latest revisions to the US Department of Transportation requirements, not limited to material identification number (#NA2212), material packaging group (PGIII), and labels. Warning labels will also include:

Legend:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

In accordance with NESHAPS, label each waste bag with the name of the waste generator and address where the material was generated. Include the Contractor name and address on each label also. Attach label in a sufficient manner such that they are properly sealed to or on the containers.

Label all waste bags, containers, and transport vehicles as required by applicable U.S. Department of Transportation Rules and Regulations.

Coveralls: Provide disposable full-body coveralls and head covers in accordance with State and federal regulations. Provide a sufficient number for all required changes, for all workers in the Work Area. Provide sufficient number for use by Owner's Representative.

Other PPE: Provide other personal protective equipment as required by OSHA regulations and industry standards, not limited to: hard hats, eye protectives, gloves, footwear and appropriate confined space entry equipment.

Respiratory Protection: Provide respiratory protection in strict accordance with ANSI Z88.2 - 1992 "Practices for Respiratory Protection" and 29 CFR 1926 and 1910.134. The respirators will be sanitized and maintained in accordance with manufacturer's specifications and recommendations. Provide sufficient respiratory protection based on applicable ANSI, NIOSH, and MSHA standards. Select proper level of protection based on personnel exposure monitoring and the applicable OSHA Permissible Exposure Limits. Use only respirators and filter that are NIOSH-approved for use with asbestos and other atmospheres anticipated during the work.

Construction Materials: Provide other construction materials such as plywood, strapping, studs, other related abatement materials, etc., as required to complete the work in accordance with this Specification.

2.03 PRESSURE DIFFERENTIAL AND HEPA FILTRATION SYSTEMS

General: Supply the required number of HEPA filtered fan units to the site in accordance with this Specification. Use units that meet the following requirements.

Cabinet: Constructed of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Provide units whose cabinets are:

-Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance
-Arranged to provide access to and replacement of all air filters from intake end
-Mounted on casters or wheels

Fans: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.

HEPA Filters: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame. Certify most recent dates for filter changes and approximate hours of usage.

Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.

Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 um dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions. Provide filters that are marked with: the name of the manufacturer, serial number, airflow rating, efficiency and resistance, and the direction of test airflow.

Pre-filters: which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. Provide units with the following pre-filters:

First-stage pre-filter: low-efficiency type (e.g., for particles 100 um and larger)
Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 um)

Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.

Provide appropriate charcoal pre-filters during all work involving use of solvents to minimize odors. Allow HEPA units to run for a sufficient period of time after use of solvents to allow for adequate number of air changes and filtration.

Instrumentation: Provide units equipped with:

-Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed
-A table indicating the usable air-handling capacity for various static pressure readings on the Magnehelic gauge affixed near the gauge for reference, or the
-Magnehelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point
-Elapsed time meter to show the total accumulated hours of operation

Safety and Warning Devices: Provide units with the following safety and warning devices:

Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter
Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge
Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge)
Audible alarm if unit shuts down due to operation of safety systems

Electrical components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.

Monitoring: Continuously monitor and record the pressure differential between the Work Area and the building outside of the Work Area. Maintain accurate records of time and locations of testing at the job site and in supervisor daily logs.

2.04 AUXILIARY GENERATOR

Provide a gasoline-powered self-starting generator (auto-start in event of power outage) with a capacity adequate to power a minimum of 75% of the HEPA filtered fan units in operation at any time during the work. Install emergency generator in Owner-designated exterior location. Provide emergency lighting for exits.

PART 3 - EXECUTION

3.01 RELATED DOCUMENTS

General provisions of the Contract, including General and Supplementary Conditions, apply to the work of each of the Specification Sections.

3.02 TEMPORARY ENCLOSURES

A. Control Access:

Isolate the Work Area to prevent entry by building occupants and the public into Work Area or surrounding controlled areas. Notify the Owner of all doors and other openings that must be secured to isolate Work Area. Access to stairwells and building exits must be maintained as indicated by Owner. Construct work area containments and isolation barriers as required allowing for Owner operations and as approved by Owner.

Secured Access: Arrange Work Area so that the only access into Work Area is through securable doors to personnel and equipment decontamination units.

Solid Construction Barriers: Provide solid construction barriers as indicated by the Owner to prohibit unauthorized access and visibility by adjacent occupants and public. At a minimum provide solid barriers as necessary to isolate all work areas with abatement activity that is conducted during periods with school in operation.

Provide Warning Signs at each door and barrier leading to Work Area reading as follows:

LEGEND

DANGER
KEEP OUT
BEYOND THIS POINT
CONSTRUCTION WORK
IN PROGRESS

Immediately inside door (leading to Work Area) and outside all accessible critical barriers post an manufactured caution sign, approximately 20 inch by 14 inch, displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

LEGEND

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

B. Respiratory and Worker Protection:

Before proceeding beyond this point in providing Temporary Enclosures:

- Provide Worker Protection per specification and regulatory requirements
- Provide Respiratory Protection per specification and regulatory requirements
- Provide Decontamination Units per specification and regulatory requirements

C. Water Service:

Hot water shall be supplied at a minimum temperature of 100 F. Supply hot and cold water to the Decontamination Unit as required herein. Supply water as required for work of the project. Maintain hose connections and outlet valves in leak-proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

D. Electrical Service:

Provide all required lock out and tag out of all existing power in the work areas as required by OSHA and industry standards. Coordinate all such work and related requirements with the Owner.

E. Critical Barriers:

Completely separate the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6 mil in thickness, or by sealing cracks leading out of Work Area with duct tape. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, roof exhausts, and other openings

into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting and other fixtures, as applicable, to avoid melting or burning of sheeting, as applicable.

F. Pressure and Circulation in the Work Area and Decontamination Units:

Isolate the Work Area from all adjacent areas or systems of the building with a Pressure Differential that will cause a movement of air from outside to inside at any breach in the physical isolation of the Work Area.

Relative Pressure in Work Area: Continuously maintain the work area at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of: 0.02 inches of water.

Accomplish the pressure differential by exhausting a sufficient number of HEPA filtered fan units from the work area. Exhaust units to the outside of the space in locations to be approved by Owner. The number of units required will depend on machine characteristics, the seal at barriers, and required air circulation. The number of units will increase with increased make-up air or leaks into the Work Area.

G. Circulation in the Work Area and Decontamination Units:

Determining the Air circulation Requirements: Provide a fully operational air circulation system supplying a minimum of the following air circulation rate: 8 air changes per hour. Provide a minimum of two additional air units for emergency purposes.

H. Exhaust System:

Exhaust all units from the Work Area (to outside of the building) to meet air circulation requirement of this section. Vent to outside of building, unless authorized by the Owner and Owner's Representative. Locate fan unit(s) so that makeup air enters work area primarily through decontamination facilities and traverses Work Area as much as possible. This may be accomplished by positioning the HEPA filtered fan unit(s) at a maximum distance from the worker access opening or other makeup air sources. Contractor shall be responsible for all temporary construction required to seal off exhaust penetration points for security and critical barrier purposes.

I. Use of Pressure Differential and Air Circulation Systems:

Demonstrate operation of the pressure differential system including, but not limited to, the following: plastic barriers and sheeting move lightly in toward Work Area; curtain of decontamination units move lightly in toward Work Area; noticeable movement of air through the Decontamination Unit; use smoke tube to demonstrate air movement from Clean Room through Shower Room to Equipment Room; use smoke tubes to demonstrate a definite motion of air across all areas in which work is to be performed; use a differential pressure meter or manometer to demonstrate the required pressure differential at every barrier separating the Work Area from the balance of the building, equipment, duct work or outside. Note: Provide continuous manometer measurements and printouts for all work performed adjacent to public occupied spaces if such spaces are occupied during the work.

Use of System During Abatement Operations: Start fan units before beginning work (before any asbestos-containing material is or may be disturbed). After abatement work has begun, run units continuously to maintain a constant pressure differential and air circulation until decontamination of the work area is complete and the air clearance criteria have been met as required herein. Do not turn off units at the end of the work shift or when abatement operations temporarily stop. Do not shut down air pressure differential system during encapsulating procedures. Supply sufficient pre-filters to allow frequent changes.

Start cleaning and abatement work at a location farthest from the fan units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and fan units are operating again. At completion of abatement work, allow fan units to run as specified under Project Decontamination requirements, to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the Work Area with clean makeup air.

When a final inspection and the results of final air tests indicate that the area has been decontaminated, fan units may be removed from the Work Area. Before removal from the Work Area, remove and properly dispose of pre-filter, decontaminate exterior of machine and seal intake to the machine with 6-mil polyethylene to prevent environmental contamination from the filters.

J. Pre-Clean Work Area:

Preclean all work area surfaces using HEPA vacuums and wet wiping. As applicable, coordinate with Owner for detachment of all electrical and mechanical items, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc. which cover any part of the surface to be worked on or which may be impacted during work. Do not complete any work that may result in disturbance to the ACM until all other work area preparations are completed. Coordinate all such work with the Owner. Complete the following after installation of (1) critical barriers, (2) pressure differential/air filtration systems, and (3) decontamination facilities as indicated below and in other Specification Sections.

- Preclean fixtures and equipment as needed and then seal non-removable fixtures and equipment with at least 2 layers of 6-mil polyethylene sheeting. Provide a minimum of 12" of overlap, sealed with spray adhesive and duct tape on both flap ends, on all joints in the barriers. Do not damage materials and items to be covered.

- After lock-out/tag-out (to be coordinated for with Owner), light fixtures will be either (1) removed, cleaned using HEPA vacuums and wet wiping, inspected to ensure all debris and dust has been cleaned, and then removed from the work area and disposed of as non-ACM waste in accordance with local, State and federal regulations, or (2) removed and disposed of as ACM waste.

- Coordinate handling of heat and smoke detectors with the Owner and City Fire Department. Include written description of handling of such detection equipment and existing sprinklers in the notification to the local emergency authorities.

Install transparent inspection windows in the containment barriers as indicated by the Owner's Representative. Maintain inspection window clean of debris and do not block to allow for inspection of work in progress.

K. Primary Barrier:

Protect building and other surfaces in the Work Area from damage from water and high humidity or from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.

Primary Barrier Sheet Plastic: Protect floor surfaces with a minimum of 2 layers of 6-mil plastic sheeting. Protect all existing wall, ceilings, fixed equipment, and other building surfaces with a minimum of 2 layer of 6-mil plastic sheeting in addition to critical barrier systems. Walls and ceiling surfaces that impervious may be left unprotected in accordance with current State regulations and all such surfaces must be fully decontaminated by Contractor following gross removal. (Owner reserves the right to conduct spot confirmation of such decontamination effort with the collection and analysis of surface dust samples).

Provide a minimum of 12" of overlap, sealed with spray adhesive and duct tape on both flap ends, on all joints in the barriers Extend floor sheeting up adjoining walls a minimum of 18 inches. Do not place seams at, or within 18" of any wall, ceiling, or floor joints. Stagger all joints by at least 18 inches.

Protect all existing building surfaces and fixed equipment/items, also including non-ACM insulations in the work areas, with a minimum of 2 layers of 6-mil plastic sheet as required to maintain existing conditions and to prevent contamination, water damage, or other damages due to the work. Provide a minimum of 12" of overlap, sealed with spray adhesive and duct tape on both flap ends, on all joints in the barriers. Install protection only after sufficient precleaning is completed.

L. Ventilation Systems

Coordinate with the Owner shutdown and lock-out/tag-out of all air handling equipment either in or running through the work areas, as applicable. Air handling systems shall be shutdown prior to the start of work. Seal all ducts and equipment with primary barriers as indicated above and in applicable Specification Sections, in addition to OSHA requirements.

M. Stop Work:

If the Critical or Primary Barrier falls or is breached in any manner stop work immediately and repair the breach as required. Do not start work until authorized by the Owner's Representative. Any contamination and/or suspect contamination, as determined by the Owner, resulting from a breach in the barriers or other neglect by the Contractor shall be thoroughly abated in accordance with this Specification at no additional cost to the Owner.

N. Decontamination Units:

Provide personnel and equipment decontamination facilities and require that the personnel decontamination unit be the only means of ingress and egress for the Work Area. Require that all materials exit the Work Area through the equipment decontamination unit. Provide portable shower units, sufficient for personnel decontamination in accordance with State of Massachusetts and OSHA regulations, and cascaded filter units on drain lines from showers or any other water source carrying asbestos-contaminated water from the Work Area. Provide units with disposable filter elements as indicated below. Connect so that discharged water passes primary filter and output of primary filter passes through secondary filter and final filter.

- Primary Filter - Passes particles 20 microns and smaller
- Secondary Filter - Passes particles 10 microns and smaller
- Final Filter - Passes particles 5 micron and smaller

Do not discharge filtered water unless testing and permitting has been completed as applicable in accordance with State and local requirements.

Provide a personnel decontamination unit contiguous to the Work Area consisting of a serial arrangement of connected rooms or spaces, changing (clean) room, shower room, equipment room. Require all persons without exception to pass through this decontamination unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry/ exit.

Personnel decontamination units may be constructed out of wood, metal, or plastic supports as necessary. The units must be completely sealed and watertight. A minimum of 2 layers of 6-mil polyethylene sheeting shall be installed on all interior walls and floors in the unit. Install all sheeting in the manner indicated for critical and primary barriers in this specification. Install black sheeting as necessary for privacy. Construct each section of the unit with sufficient size to adequately accommodate decontamination and other work activities.
Construct the unit such that traffic out of the Work Area proceeds (1) into the equipment room, (2) through an airlock, (3) into the shower room, (4) through an airlock, (5) into the clean room, and (6) exit the containment system. Install air locks between the clean room, shower room, and equipment room. At a minimum, air locks must be 24" in length. Install polyethylene sheeting in the air locks in the same manner as noted above.

Clean Room: Do not allow any asbestos-contaminated material in this room. Access is only from the non-work area (or non-containment areas) or from the shower room after complete decontamination.

Shower Room: Shower room shall contain one or more showers with proper fixtures and hot and cold water supply. Provide an adequate supply of soap, shampoo, and towels for personnel entering the work area. Collect all shower water and filter through the primary, secondary, and final filters. Provide additional protective coverings as needed to protect the building surface from water or humidity damage.

Flap Doors: Provide flap doors separating each section of the unit. Fabricate from two (2) overlapping sheets with openings a minimum of three feet (3') wide. Configure so that sheeting overlaps adjacent surfaces. Weigh sheets at bottoms as required so that they quickly close after being released. One sheet shall be secured at the top and left side, the other sheet at the top and right side.

Provide an equipment decontamination unit contiguous to the Work Area consisting of a serial arrangement of connected rooms or spaces, constructed in the manners indicated for the personnel decontamination unit. Require all materials, equipment, other contaminated items used during the work, and waste containers to exit through the equipment decontamination unit.

Clean debris and residue from inside of Decontamination Units on a daily-, and ongoing-, basis. Damp wipe or hose down all surfaces after each shift change. If the clean room of the personnel decontamination unit becomes contaminated with asbestos-containing debris, abandon the entire Decontamination Unit and erect a new Decontamination Unit. Use the former clean room as an inner section of the new equipment room.

Post an approximately 20 inch by 14 inch manufactured caution sign at each entrance to the Work Area displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

LEGEND

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

Adequately secure door to entrance of decontamination unit at the completion or each shift.

3.03 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. Inspections:

Prior to commencing Work of this Section, the Work Area must pass an inspection by the Owner's Representative to document that sufficient area preparations are completed. Commence with Work of this Section only after authorization is received from the Owner's Representative. Maintain all work area isolation and controls during work of this section.

The Contractor is responsible for conducting routine and regular inspections of surrounding areas beneath, as applicable, and adjacent to the work areas for containment breeches and leaks. The Contractor is responsible for completing any clean up and decontamination work that is necessitated due to breeches and leaks as determined by the Owner or Owner's Representative.

B. Secondary Barrier:

Over any floors in the work areas, install as a drop cloth a clear 6-mil sheet plastic in all areas where asbestos removal work is to be carried out. Completely cover floor with sheet plastic. Install Secondary Barrier at the beginning of each work shift. Install only sufficient plastic for work of that shift. Remove Secondary Barrier at end of each work shift or as work in an area is completed. Carefully pack in disposal bags.

C. Wet Removal - General:

Thoroughly wet ACMs to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Maintain materials as adequately wetted during Work and as required by NESHAPS. Accomplish wetting by a fine spray (mist) of amended water. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water to penetrate material and seams thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions.

Allow penetration of amended water. Where necessary, carefully strip away while simultaneously spraying amended water on the installation to minimize dispersal of asbestos fibers into the air. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels. Do not allow ACMs to dry out. As it is removed, simultaneously pack material into appropriate disposal bags. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to the equipment decontamination unit for further cleaning and packaging.

D. Airborne Fiber Counts:

General: Use work procedures that result in 8-hour TWA and STEL airborne fiber counts within the required limits established by OSHA. If airborne fiber counts exceed this level immediately mist the area with amended water to lower fiber counts and revise work practices and engineering controls to maintain level within the required limits.

E. Gross Removal of Tank, Breeching, Pipe and Fitting Insulation

As applicable, comply with all confined space work safety procedures in accordance with 29CFR Part 1910.146. Provide all proper personal protective equipment, worker training and written programs per current OSHA requirements.

Spray insulation material with a mist of amended water. Allow amended water to saturate material to substrate. Remove fiberglass in contact with the ACBM and damaged fiberglass insulation in the general vicinity of damaged ACM as asbestos contaminated waste. With a second worker holding a waste bag below the area to be worked on, cut bands holding preformed insulation, slit jackets at seams, remove and hand-place into a disposal bag. Remove job-molded fitting insulation in chunks and hand place to the bottom of the waste bag. Spray amended waster continuously such that ACM is adequately wetted. Do not drop any material or allow material or water to fall on to the floor or other lower surfaces. Remove any residue on substrate with stiff bristle nylon hand brush. Again, place all waste directly into a waste bag. Coordinate shut-off and lockout of systems with the Owner. Take precautions to avoid burns and heat stress when working in areas of hot equipment and excessive heat as applicable. Remove any fiberglass in contact with ACBM or deemed contaminated by Owner’s

Representative. All other non-ACBM insulation shall be precleaned, sealed in primary barriers and left in place unless otherwise designated by Owner. Cut back (and remove as asbestos waste) all fiberglass insulation within 4" of ACM insulation removed.

After completion of gross removal and cleaning operations (and passing preliminary visual inspection by IH Consultant), remove the outer boiler casing with in the containment area. Fully clean all exterior casing using wet wiping and HEPA vacuuming. Store and cover with polyethylene sheeting in the work area and place into temporary storage area(s) as approved by Owner. Once the exterior casing is removed, fully clean all insulation, gasket, and refractory brick as assumed-ACBM unless otherwise stated by Owner and IH Consultant based on proper testing to be performed as Owner deems in it's best interest. In lieu of IH Consultant testing of suspect material, such materials will be handled as, and removed as, ACBM as stated herein. Coordinate all such testing of suspect material encountered with IH Consultant. Provide a minimum of 48 hour advance notice of requested testing by IH Consultant.

Fully disassemble and demolish entire boiler as needed to remove and properly dispose or recycle all boiler components in accordance with local, state and federal requirements in addition to Owner demolition specification sections. All assumed ACBM and confirmed ACBM insulation, gasket, packing, brick and other ACBM within and on the boiler shall be removed using the above stated methods by the abatement contractor. In the event that suspect ACBM is encountered during disassembling and demolition of the boiler unit, work shall cease in the affected area, and notify the IH Consultant. The IH Consultant will then conduct testing or assume the materials to be ACBM and the contractor shall then coordinate and conduct necessary abatement of all additional ACBM identified in accordance with the work methods stated herein and applicable local, State and Federal requirements. Update all local, State and Federal permits and notifications as needed.

F. Glovebag Removal of Pipe Insulation in Crawlspace Areas

Glovebags shall be used to remove pipe insulation within crawlspace work areas. Pre-clean all crawlspace work areas prior to conducting removal and install negative pressure enclosures and polyethylene sheeting drop clothes under all pipes to be abatement and along all walkways. In areas of soil/dirt floor, prior to removal and final preparation work wet ground/floor areas with amended water. Hand pick gross debris or HEPA vacuum gross debris. Fine cleaning or contaminated soil will be completed following abatement of pipe insulation as indicated below. Once all gross debris has been removed, install floor and drop clothes.

Coordinate shut-off and lock-out of systems with the Owner. Take precautions to avoid burns and heat stress when working in areas of hot equipment and excessive heat as applicable. Comply with all confined space work safety procedures in accordance with 29CFR Part 1910.146. Provide all proper personal protective equipment, worker training and written programs in accordance with current OSHA requirements.

Glovebags will be used for the removal of pipe and fitting insulation within negative pressure enclosures and for small-scale short duration activity outside of negative pressure enclosures as approved by IH Consultant. Glovebags will be used in strict accordance with 29 CFR 1926.1101 (OSHA) and other applicable regulations. Install negative pressure enclosure containment. After the negative pressure enclosure in constructed, install glovebags in accordance with manufacturer's instructions and regulatory requirements.

Once completely sealed around the pipe to be worked on, inspect visually and using smoke testing as needed. Spray insulation and coverings with a mist of amended water. Allow amended water or removal encapsulant to saturate material to substrate. Cut bands holding preformed insulation, slit jackets at seams, remove and hand-place in a disposal bag or bottom of glovebag as applicable. Provide dedicated water supply to each glovebag during the entire removal and cleaning operation within the glovebag. Remove job-molded fitting insulation in chunks and hand place to the bottom of the glovebag. Spray amended water continuously such that ACM is adequately wetted. Do not drop any material or allow material or water to fall out of the glovebag or to fall to the floor. Remove any residue on pipe or fitting with stiff bristle nylon hand brush. Once all cleaning is complete, twist the glovebag with the debris at the bottom of the glovebag and seal with duct tape. Remove the glovebag, bend the top over, and then reseal the neck with duct tape.

After gross removal and final cleaning of the pipe insulation, remove drop cloths and ground/floor polyethylene sheeting in areas of soil contamination. Remove all visible debris to a minimum depth of 3" and lightly rake surface while conducting misting operations. Start from furthest point (away from decontamination unit) and do not track debris or walk from dirty areas to newly removed areas. Then inspect and rake through remaining soil areas and remove any debris. Continue process until no visible debris is present or can be brought easily to the surface. All soil generated by this process and debris will be handled, packaged, and disposed of as ACM waste.

G. Handling of suspect ACBM Encountered in Mechanical Equipment and Previously Inaccessible Space

It is possible the interiors of various mechanical equipment at the site contain ACBM. During the course of work, use care when accessing previous inaccessible spaces. Or mechanical equipment, in the event that gasket material, caulk, or other suspect insulation are encountered, notify Owner and IH Consultant immediately such that proper testing and inspection can be arranged for. In the event that ACBM is identified requiring abatement, conduct abatement in accordance with this specification and the Contract Documents and as authorized by Owner. In the event that additional suspect ACBM or known ACBM is encountered within wall, floor, or ceiling space that was inaccessible previous to the work, stop work in the effected area and immediately notify the Owner and IH Consultant such that proper inspection and testing can be arranged for. Conduct abatement of such addition ACBM in accordance with this specification and the Contract Documents and as authorized by Owner.

3.04 INITIAL CLEAN-UP WORK:

Once gross removal is completed, clean all visible debris on the substrate and primary barrier using HEPA vacuums, scrub brushes, and wet-wiping. Do not allow materials to dry out. As material is removed and clean up is completed, simultaneously pack wetted material into proper waste disposal bags or package as noted above. For waste bags, twist the neck of the bags, bend the neck over, and seal with a minimum of three wraps of duct tape. Clean the outside of the bags with wet wiping and HEPA vacuum and move to the wash down station in the Equipment Decontamination Unit. Once washed clean, place the clean disposal bags into a second asbestos disposal bag and seal the bag in the same manner as the first. Bags will then be transported from the work area to the asbestos waste dumpster. Note: Waste dumpster must remain labeled and locked at all times when loading is complete or idle.

Label waste dumpsters in accordance with 29 CFR 1910.145: Legend

DANGER
ASBESTOS DUST HAZARD
CANCER & LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

Change all filters on the pressure differential systems and properly dispose of as asbestos waste. Maintain adequate filtration and pressure differential during all filter changes.

3.05 PROJECT DECONTAMINATION

General: Complete decontamination of the Work Area following asbestos abatement in accordance with regulatory requirements and industry standards.

Work of This Section includes the decontamination of air in the Work Area which has been, or may have been, contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable asbestos-containing materials in the space. Work of This Section includes cleaning, decontamination, and removal of temporary facilities installed prior to abatement work, including:

- Primary and Critical Barriers
- Decontamination Unit
- Pressure Differential System

Work of This Section includes the cleaning, and decontamination of all surfaces (ceiling, walls, floors, and contractor equipment and materials) of the Work Area, and all other furniture or equipment in the Work Area.

A. Start of Work:

Previous Work: During completion of the asbestos abatement work specified in other sections, all Secondary Barriers of polyethylene sheeting will have been removed and disposed of along with any gross debris generated by the asbestos abatement work.

Start of Work: Work of this section begins with the cleaning of the Primary Barrier. At start of work the following will be in place and fully operational: primary barriers, critical barriers, decontamination units, and pressure differential/air filtration systems.

B. First Cleaning:

First Cleaning: Carry out a first cleaning of all surfaces of the work area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a High Efficiency Particulate Air (HEPA) filtered vacuum. (Note: A HEPA vacuum may fail if used with wet material.) Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose of as contaminated waste. Continue this cleaning until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces.

Provide adequate lighting on all surfaces being cleaned, sufficient number of ladders as applicable, sufficient number of personnel misting the area as needed, and adequate numbers of HEPA vacuum equipment.

Contractor's Testing: At the completion of the above cleaning visually inspect all surfaces. Reclean if any dust, debris, etc. is found. Inspect the area and if any debris or dust is found, repeat the cleaning. Continue this process until no debris dust or other material is found while sweeping of all surfaces with forced-air equipment.

Remove all filters in Air Handling System(s) and dispose of as asbestos-containing waste in accordance with specification requirements. Use oscillating fans as necessary to assure circulation of air in all parts of work areas during this period. Maintain Pressure Differential System in operation for adequate settling period.

C. Second and Third Cleaning:

Second Cleaning: Carry out a second cleaning of all surfaces in the work area in the same manner as the first cleaning. Remove all drop-cloth layers of polyethylene sheeting on the floor leaving one layer of the primary barrier remaining. Clean newly exposed areas as above. Third Cleaning: Carry out a third cleaning of all surfaces in the same manner as the first cleaning. Change filters on pressure differential systems and properly dispose of as asbestos waste. Allow for sufficient settling period prior to clearance testing. Complete additional cleaning as required.

D. Visual Inspection:

Accompanied by the Owner's Representative, perform a complete visual inspection of the entire Work Area including: all surfaces, ceiling, walls, floor, decontamination unit, all plastic sheeting, seals over ventilation openings, doorways, windows, and other openings; look for debris from any sources, residue on surfaces, dust or other matter. During visual inspection sweep entire work area including walls, ceilings, ledges, floors, and other surfaces in the room with exhaust from forced air equipment (leaf blower with approximately 1 horsepower electric motor or equivalent). If any debris, residue, dust or other matter is found repeat final cleaning and continue decontamination procedure from that point. Visual inspection is complete when the area is visually clean, and if after sweeping of all surfaces with leaf blower, no debris, residue, dust or other material is found.

Provide adequate lighting during the visual inspection. Provide ladders, scaffolding, and lifts as required to provide access to all surfaces in the area to be subjected to visual inspection. Encapsulation of substrate: After successful visual inspection, perform encapsulation of substrate as directed. Only apply encapsulant materials that are compatible to any replacement materials to be installed. Owner must approve all encapsulants to be applied. Maintain Pressure Differential System in operation during encapsulation work.

E. Clearance Testing:

Air clearance sampling will be conducted by the Owner's Representative in strict accordance with AHERA and State of Massachusetts regulations and as required below. Air clearance testing will not be completed until the work area has adequate air changes and surfaces have had sufficient time to dry.

F. Removal of Work Area Isolation:

Only after all requirements of this section and the work area clearance sections have been met and verified by the Owner's Representative:

Remove all Primary Barrier sheeting and equipment decontamination unit(s), leaving only: critical barriers, personnel decontamination unit, and operational pressure differential/air filtration systems. Properly dispose of sheeting as asbestos-waste. Reinspect all work area surfaces and adjacent areas for any dust and debris that may have originated from the work. With critical barriers and pressure differential/air filtration systems still in place and in operation, clean all surfaces using HEPA-vacuums and wet-wiping as required and until all surfaces are clean of visible debris. Shut

down and remove the Pressure Differential System. Seal HEPA filtered fan units, HEPA vacuums and similar equipment with 6-mil polyethylene sheet and duct tape to form a tight seal at intake end before being moved from Work Area.

Remove personnel decontamination unit. Remove the critical barriers and properly dispose of as asbestos-waste. Remove any small quantities of residual material found upon removal of critical barrier plastic sheeting with wet wiping, HEPA filtered vacuum cleaners and local area protection.

If significant quantities, the entire area affected shall be decontaminated as specified herein using newly installed critical barriers and negative pressure. Once fully cleaned, remove all equipment, materials, and debris from the work site. Dispose of all asbestos-containing waste material as specified herein.

G. Final Cleaning:

General: Complete work upon completion of Removal of Work Area Isolation as required above. This cleaning is now being applied to existing room conditions. Take care to avoid watermarks or other damages. Wet-wipe and HEPA vacuum surfaces in the work area until clean and free from dust and debris. Complete final cleaning in accordance with the project closeout requirements.

3.06 WORK AREA CLEARANCE

A. Contractor Release Criteria:

The Work Area is cleared when the Work Area meets the visual inspection criteria described in the project decontamination sections of this specification and airborne asbestos structure concentrations have been reduced to the level specified below.

B. Air Monitoring:

To determine if the elevated airborne asbestos structure concentration encountered during abatement operations has been reduced to the specified level, the Owner will secure samples and analyze them according to the procedures stated herein. Contractor must provide at least 48 hours advance notice to the Owner's Representative for any clearance testing or other inspections required, or for any changes to existing schedules.

C. Analytical Method:

The number and volume of air samples taken and analytical methods used by the Owner will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used. TEM clearance testing and analysis will be performed for clearance purposes in accordance with the protocols stated in AHERA.

D. Laboratory Testing:

The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. Samples will be sent daily by overnight mail, so that verbal reports on air samples can be obtained within 24 hours (Monday through Fridays).

E. Aggressive Sampling:

Air clearance samples will be collected by the Owner in all containment areas using aggressive sampling techniques in accordance with Massachusetts regulations and AHERA.

F. TEM Air Clearance Testing:

TEM air clearance testing will be completed in the work area after completion of all cleaning work; a minimum of 13 samples will be taken and analyzed as follows:

. Samples will be collected at 9.9 liters per minute (LPM);
A minimum of 5 samples inside of the work area and 5 samples outside of the work area will be collected;
A minimum of 1,200 liters of air will be collected for each sample, and samples will be collected simultaneously.
A total of 3 blanks will be used in accordance with AHERA for each work area clearance.

Each sample will be collected on a 25mm sample cassette with a nonconductive extension cowl and 0.45 micron pore size, mixed cellulose ester filter media. Analysis will be performed using the analysis method set forth in the AHERA Regulation 40 CFR Part 763 Appendix A. Asbestos Structures referred to in this Section include asbestos fibers, bundles, clusters or matrices, as defined by method of analysis.

Release Criteria: Decontamination of the work site is complete if either of the following two sets of conditions are met:

1. Work Area Samples are below filter background levels:
   - All Work Area sample volumes are greater than 1,199 liters for a 25 mm. sampling cassette.
   - The average concentration of asbestos on the five Work Area Samples does not exceed the filter background level of 70 structures per square millimeter of filter area.

2. Work Area Samples are not statistically different from Outside samples (see below note):
   - All sample volumes except for blanks are greater than 1,199 liters for a 25 mm. sampling cassette.
   - The average asbestos concentration of the three blanks is below the filter background level of 70 structures per square millimeter of filter area.
   - Average asbestos concentrations in Work Area Samples are not statistically different from Outside samples, as determined by the Z-test calculation found in 40 CFR Part 763, Subpart E, Appendix A (Z is $\leq$ 1.65)

If these conditions are not met then the decontamination is incomplete and the cleaning procedures shall be repeated.

The Contractor shall be responsible for all costs for each subsequent and additional round of TEM analysis required until the clearance criteria is met. Note: In the event that the Contractor requests the use of the clearance criteria indicated in Paragraph 2 above, then the Contractor will be responsible for the costs for analyzing the 5 outside samples and 3 blanks in the event that the results Z-Test Method still fails to meet the clearance criteria. All such costs shall be deducted by the Owner from final payment(s) to the Contractor.

Termination of Analysis: if the arithmetic mean (average) asbestos concentration on the blank filters exceed 70 structures per square millimeter of filter area the analysis will cease and new samples collected.

3.07 DISPOSAL OF ASBESTOS-CONTAINING WASTE MATERIAL

A. General:

Asbestos-containing waste materials and debris which is packaged in accordance with the provisions of this Specification may be disposed of at designated sanitary landfills when certain precautions are taken not limited to: notice to appropriate EPA Regional Offices and notice and permit from appropriate State and local agencies are completed.

Waste disposal site(s) must be properly licensed, permitted, and qualified to accept and handle ACM waste in accordance with all applicable local, State, and federal codes and regulations.

B. Disposal:

Comply with the following sections during all phases of this work: worker protection requirements and respiratory protection requirements. All waste is to be hauled by a waste hauler with all required licenses form all state and local authority with jurisdiction.

Carefully load all containerized asbestos-containing waste material on sealed trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the materials.

All materials are to be properly containerized in one of the following: (1) Two 6 mil disposal bags, or (2) Two 6 mil disposal bags and a fiberboard drum. Do not store disposal-bagged material outside of the work area. Take bags or drums from the work area directly to a sealed truck or dumpster. Glovebags shall not be used as waste disposal bags.

Owner will provide a designated location for placement of proper waste dumpster. Waste dumpster(s) will not be allowed to remain at the job site for longer than 72 hours upon completion of each phase (work area) of work by the Contractor. Do not transport disposal-bagged materials on open trucks. Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as asbestos-containing waste and dispose of in accordance with this specification. During loading and unloading, properly demarcate and label dumpster on all 4 sides. Dumpster shall be sealed, labeled and locked during all non-loading periods.

In accordance with NESHAPs and State regulations, advise the landfill operator or processor in advance of transport, of the quantity of material to be delivered. At disposal site unload containerized waste:

At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, leave in truck and clean entire truck and contents using procedures set forth herein.

Retain receipts from landfill or processor for materials disposed of. At completion of hauling and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to Owner's Representative.

3.08 RESTORATION AND REPLACEMENT

The Contractor shall provide all labor and materials required to (1) restore the building, building finishes, and building contents from damages due to the Contractor's work. All restoration work shall be completed in strict compliance with all City and State building codes, regulations, and industry standards. Provide/ install materials that meet or exceed the strictest requirements indicated herein and in the Contract Documents.

Contractor shall pay for and obtain all necessary permits for the work. The Contractor shall provide written certification that all replacement and restoration materials, as applicable, are asbestos-free. The Contractor shall use skilled, qualified craftsmen to complete all such work; the Contractor will use licensed craftsmen as required.

Complete all repair work as designated by the Owner and to meet or exceed existing conditions as indicated in the Contract Documents. Provide asbestos-free repair materials. All workers conducting repair work must be trained, experienced, and licensed in accordance with State and local codes and regulations. All such work must be completed in strict accordance with all State and local building codes, regulations, and industry standards. The Owner must approve all repair and replacement materials and work.

Owner will provide all material, labor, and other incidentals necessary to install new asbestos-free insulation on all fittings and straight-barrel pipe insulation removed during the course of work.

3.09 PROJECT CLOSEOUT

A. Restoration Work:

Complete all replacement work and restoration, as applicable, in accordance with the Contract Documents. Provide certification that all replacement and restoration materials are asbestos-free.

B. Substantial Completion

Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following: (1) complete all abatement and decontamination, interim or ongoing submittal requirements, final air clearance requirements, and removal of containment barriers; and (2) complete general house cleaning, touch-up painting, replacement work, repair and restoration of marred exposed finishes, and other work as required to restore the work area to meet or exceed existing conditions as designated by the Owner.

C. Final Acceptance

Preliminary Procedures: Before requesting final inspection for Final Acceptance, complete the following: (1) Submit Closeout Submittals and (2) complete any remaining punch-list items.

Reinspection Procedure: The Owner will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Owner's Representative.

D. Record Document Submittals

Record Specifications: Maintain one complete copy of the Specification, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual work performed in comparison with the text of the Specifications and modifications.

E. Execution:

General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities". Complete all final, general house-keeping and cleaning in the work areas in accordance with such activities in accordance with 29 CFR Part 1910 and 29 CFR Part 1926, as applicable. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following cleaning operations before requesting inspection for substantial completion.

- Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. HEPA-vacuum adjacent carpeted surfaces and other building surfaces in and adjacent to the work areas.
- Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
- Clean the site as applicable, including landscape development areas, of rubbish, litter and foreign substances.

Removal of Protection: Remove temporary protection and facilities installed for protection or security of the work during construction.

Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

DIVISION 3

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 GENERAL

A. Part A and Division 1 of Part B are hereby made a part of this Section.

B. Examine all drawings and all other sections of the specifications for requirements therein affecting the work of this trade.

1.02 WORK TO BE PERFORMED

A. The work under this section consists of furnishing all labor, materials, equipment and services required to complete all concrete work as indicated on the drawings and as specified herein, and includes, but is not limited to the following:

1. Furnishing, setting forms, placing, finishing, curing and protection of all cast-in-place Portland cement reinforced concrete for new equipment housekeeping pads.

2. All other items of concrete, cement finish and related work indicated on the drawings, specified or obviously needed to make the work of this section complete.

1.03 COORDINATION OF WORK

A. The Contractor shall coordinate the work of this section with the work of other trades, affecting the proper installation of the work under this section.

1.04 REQUIREMENTS OF REGULATORY AGENCIES

A. The Contractor shall keep available on the site, for reference at any time, the following literature, including latest revisions which are hereby included in and made part of these specifications.

1. Massachusetts State Building Code, latest issue

2. ACI 347, Recommended Practice for Concrete Formwork

3. ACI 605, Recommended Practice for Hot Weather Concreting

4. ACI 309, Consolidation of Concrete

5. ACI 613, Recommended Practice for Selecting Properties for Concrete

6. ACI 614, Recommended Practice for Measuring, Mixing, and Placing Concrete

B. Any material or operation specified by reference to the published specifications of a manufacturer, the American Concrete Institute (ACI), the Concrete Reinforcing Steel Institute (CRSI), the American Society for Testing and Materials (ASTM), the American Welding Society (AWS), the National Ready-Mixed Concrete Association (NRMCA), or other published standards, shall comply with the standard listed. In case of conflict between the referenced specifications, the one having the most stringent requirement shall govern. In case of conflict between the referenced specifications, and the project specifications, the project specifications shall govern.

1.05 INSPECTION, TESTING AND QUALITY CONTROL

A. A testing agency may be selected by the Engineer and will be paid for by the Owner.

B. Testing and approvals are required to aid the Contractor in adhering to the specification requirements and in no way are meant to be construed as relieving the Contractor of his responsibility to fulfill all the requirements of the contract documents.

C. Those portions of the structure that do not meet the contract requirements shall be corrected or removed and replaced as directed by the Engineer and all cost of corrections, removal and replacement shall be at the Contractor's expense.

1.06 SUBMITTALS

A. Submit shop drawings in accordance with applicable requirements under Division 1 and as follows:

1. The Contractor shall submit to the Engineer for review two checked prints and one reproducible of all shop drawings until approved. Any corrections required by the Engineer shall be made immediately and corrected copies (reproducibles and prints) of the drawings affected shall be returned to the Engineer. Then, after final approval, copies shall be distributed by the General Contractor. It is required that all shop drawings submitted for review shall be checked by the General Contractor and so indicated. All drawings submitted without being checked and without bearing the Contractor's stamp of approval shall be returned without being reviewed by the Engineer.

2. Submit reinforcement shop drawings showing detailed layouts, including materials, dimensions, spacing, and similar items required for the proper construction of the work.

PART 2 - MATERIALS

2.01 GENERAL REQUIREMENTS

A. The following is a description of material requirements to be furnished for work within this section.

B. Unless otherwise noted, when compliance with the referenced specifications, or this specification, is specified for materials or a manufactured or fabricated product, the Contractor shall furnish the Engineer with an affidavit from the manufacturer or fabricator certifying that the material or product delivered to the project meets all the requirements of the contract documents.

1. Cement shall be American made Portland Cement, free from water soluble salts of alkalis which will cause efflorescence on exposed surfaces. Cement shall conform to all chemical and physical requirements of ASTM C150 for Type I and II. Type III Portland Cement shall not be used.

2. Fine Aggregate (Normal Weight) shall consist of clean, hard, sound, durable sand, free from salt, loam and clay and shall conform to "Specifications for Concrete Aggregates" (ASTM C33).

3. Coarse aggregate shall consist of clean, hard, durable, sound, gravel, crushed gravel, or crushed stone free from harmful amounts of soft, thin, elongated or laminated pieces, and shall conform to Size Grading for Severe Weathering Regions of ASTM Specifications C33.

4. Peastone shall be a washed clean, hard, rounded gravel conforming to ASTM C-33, except that it shall be graded to 90% passing the 3/8" screen and 90% retained on the 1/4" screen.

5. Mixing water for concrete shall be potable and from a domestic supply.

6. Admixtures

a. A water-reducing agent conforming to ASTM C494 shall be used in all concrete.

b. Admixtures retarding setting of cement in concrete shall not be used.

c. Admixtures causing accelerated setting of cement in concrete shall not be used. Calcium chloride shall not be used.

7. Concrete shall be reinforced with re-bars (3/8" diameter min. or other as noted on the drawings) 18" on center both ways at mid-point and 6" x 6" wire cloth. Re-bars shall be deformed bars and

shall conform to the requirements of ASTM A-615, Grade 40. Wire cloth shall be deformed and shall conform to the requirements of ASTM A-82.

2.02 MIXES

A. Concrete Mixes

1. All concrete shall be ready-mixed produced by a plant acceptable to the Engineer. Hand or site mixing may be performed only with the prior approval of the Owner or Engineer. All constituents, including admixture, shall be batched at the central batch plant.

2. Materials shall be measured by weighing. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one (1) percent of the indicated amount. Cement in standard packages (sack) need not be weighed. The mixing water shall be measured by volume or by weight. The water measuring device shall be accurate to 1/2%.

3. Central mixed concrete shall be plant mixed a minimum of five (5) minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharged. Concrete shall be delivered and discharged within 1-1/2 hours or before the drum has revolved 300 times after introduction of water to the cement and aggregate.

2.03 CONCRETE STRENGTH

A. Concrete shall have the minimum compressive strength at 28 days of 3,500 psi.

B. The Contractor shall be responsible for establishing the basic concrete mixtures. He shall submit the results of the mixtures to the Engineer for acknowledgment and verification that mixtures conform in every respect to the contract requirements based on the materials supplied by the Contractor. The Contractor, after receiving verification from the Engineer, shall assume full responsibility for the final results to the completion of the contract. No concrete shall be cast until receipt of Engineer's verification.

C. It is the intent of this section to secure, for every part of the work, concrete of homogeneous structure which, when hardened, will have the required strength, density, imperviousness to water, appearance, and resistance to wear and weathering. The actual proportions of constituents necessary to produce concrete conforming to the following specific requirements shall be determined by means of prior laboratory tests made with the constituents to be used in the work. Proportioning of concrete mixtures shall be carried out in accordance with Chapter 3 - PROPORTIONING OF CONCRETE MIXTURES - ACI 301, "Specifications for Structural Concrete for Buildings" and as specified herein.

D. The following limiting strengths, water-cement ratios, cement factors, etc., as shown in TABLE A, shall apply for the specific strengths of concrete.

TABLE A

Minimum Allowable Compr. Str. @ 28 days psi	Max. Allowable Net Water Content Gals/Sack*	Minimum Permissible Cement Factor Sacks/Cu. Yd.**
Normal Weight		
3000	6.50	5.0

* Maximum: Decrease, if possible; this represents total water in mix at time of mixing, including free water on aggregate.

** Minimum: Increase as necessary to meet other stated requirements.

E. The approved water-reducing agent shall be added to all concrete.

F. The water content and cement content of the concrete to be used in the work shall be based on a curve showing the relation between water content, cement content and the 7 and 28 day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four (4) or more points, each representing an average of at least three (3) test specimens at each age, and shall have a range of values sufficient to yield the desired data, without extrapolation. The design mix of the concrete to be used in the structure, as determined from the curve shall correspond to the following test strength (TABLE B) obtained in the laboratory trial mixtures, but, in no case, shall the resulting mix conflict with the limiting values as specified in TABLE A. Note that all concrete has been designed by ACI Ultimate Strength Design Method.

TABLE B

Minimum Strength of Lab Trial Mixes

Design Strength	Trial Mix Strength 7 days	28 Days
3500	2700	3750

PART 3 - INSTALLATION

3.01 INSTALLATION OF REINFORCED CONCRETE

A. Placing Concrete:

1. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of the ingredients and avoid rehandling. Deposit no partially hardened concrete. If the discharge end of the chute is more than five feet above the surface of the concrete in forms, a spout shall be used, and the lower end maintained as near the surface of deposit as practicable. Concrete shall not be allowed to flow horizontally over a distance exceeding five feet.

2. Concrete shall be deposited continuously, and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section.

3. Concrete, during and immediately after depositing, shall be thoroughly compacted by means of internal type mechanical vibrators to produce required quality of finish. All vibrators shall be operable and on site prior to starting placement.

4. After concrete has been placed, provide protection against rapid drying and after finishing operations.

B. Reinforcing

1. Concrete work (including housekeeping pads) shall be fastened to existing surfaces wherever and whenever practicable. Fastening shall be accomplished by using deformed #3 re-bars doweled a minimum of 4" into the existing surfaces at 4' O.C. (min.). Deformation of re-bar shall occur at approximately the mid-point in depth of the pour. Wire cloth shall be fastened to re-bar at deformation and shall be supported level.

C. Forms

1. Forms Construction: Forms shall be of new wood conforming to the shapes, lines, grades and dimensions required. Forms shall be of sufficient strength and shall be so braced to remain in correct position during and after depositing of concrete, insure adequate support until concrete has sufficient strength for removal of forms, and produce a plumb, true even concrete surface. Wood forms for exposed surfaces shall be plywood. Remove forms after concrete has set sufficiently to support its own weight and all loads upon it.

D. Finishing Concrete Surface

1. Cast-in-place concrete surfaces shall be finished as follows:

a. After the concrete has been placed, struck off, consolidated, screeded, and floated, and before it has hardened appreciably, all water, firm, and foreign materials which may work to the surface shall be removed by means of lutes. Prior to removal of screeds, the surface shall be checked for trueness and level, and filled or cut down where necessary. Rough finishing shall be repeated with straightedge and float.

b. The finished surface shall be a true plane within 1/8 inch in 10 feet as determined by a 10-foot straight-edge placed anywhere on the slab in any direction. Measurements shall be taken before removing supporting forms or shoring.

c. Housekeeping pads shall be finished all around with 3/4" chamfer on top edge and shall extend a minimum of 4" in all directions away from equipment that will be placed on them. Height to be 6" unless noted otherwise on plans.

2. The Contractor, at his own expense, shall do all leveling and grinding of depressed and high spots in concrete surfaces in excess of the tolerances specified above. In areas where leveling materials are required to provide the proper surface, such materials shall be of a type approved by the Engineer.

E. Curing, Protection, Form Removal

1. Protect all concrete work against injury from heat, cold, and defacement of any nature during construction operations.

2. Concrete, particularly exposed surfaces, shall be treated immediately after concrete or cement finishing is completed to provide continuous moist curing above 50 degrees F. for at least six (6) days regardless of ambient air temperatures.

NOTE: The purpose of moist curing is to continuously provide additional available water to the concrete to permit hydration of cement. Periodic sprinkling is not effective in curing, and will not be accepted as meeting curing requirements.

3. Removal of forms shall not take place until concrete has cured sufficiently to support its own weight, retain its shape and support all loads upon it. The procedure for removing forms shall be such that no damage is done to the concrete during form removal.

END OF SECTION

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PLUMBING

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SECTION 15400
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. Provide demolition of existing equipment and piping necessary for the installation of replacement equipment.

B. Install gas piping up to new burners.

C. 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 - General
2. Cold Water Piping
3. Gas Piping
4. Unions and Flanges
5. Pipe Joint Materials
6. Hangers, Inserts and Supports
7. Seismic Restraints
8. Sleeves, Firestopping
9. Valves
10. Cleaning and Testing
11. Shop Drawings
12. Record (As-Built) Drawings

D. Work of this Section is generally shown on the Drawings: M0.00, MD2.00, M2.00.

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. 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. Painting, except as specified herein.
2. Electrical power wiring for all equipment.
3. Temporary light, power, water, gas and sanitary facilities for use during construction and testing. Refer to Division 1, General Conditions.

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. ***"Work by Others"*** shall mean work not provided by this Contractor, but work furnished and/or installed by other Contractors (performing their respective work) as a part of this contract.

9. ***"Piping"*** shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.

10. ***"Furnished by others"*** shall mean materials or equipment purchased and set in place under other sections of the general contract and connected to the systems covered by this section of the specifications by this trade contractor.

11. ***"Coordinate"*** shall mean all work provided under this section of the specification shall be in compliance with work of other trades.

12. ***"Owners Representative"*** shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.

13. ***"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.

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 2.00)

2. Massachusetts Fuel Gas Code (248 CMR 3.00)

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. Factory Mutual System (FM)
6. Institute of Electrical and Electronic Engineers (IEEE)
7. Cast Iron Soil Pipe Institute (CISPI)
8. Plumbing and Drainage Institute (PDI)
9. National Association of Plumbing-Heating Cooling Contractors (NAPHCC)
10. National Electrical Manufacturer's Association (NEMA)
11. National Fire Protection Association (NFPA)
12. National Sanitation Foundation (NSF)
13. Plastic Pipe and Fittings Associations (PPFA)

C. All pressure vessels shall conform to ASME and Massachusetts Codes and Regulations.

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.

1.05 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. 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.

1.07 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 lock 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 an 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

2. Cold Water Piping

3. Gas Piping

4. Unions and Flanges

5. Pipe Joint Materials

6. Hangers, Inserts and Supports

7. Seismic Restraints

8. Sleeves, Firestopping

9. Valves

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 subcontractor 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. Plumbing 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 Plumbing Contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. INFORM SUBCONTRACTORS, MANUFACTURERS, SUPPLIERS, ETC. OF SCOPE AND LIMITED NATURE OF REVIEW PROCESS AND ENFORCE COMPLIANCE WITH CONTRACT DOCUMENTS.

I. In the event that the Plumbing Contractor fails to provide Shop Drawings for any of the products specified herein:

1. The Plumbing Contractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.

2. If the Plumbing 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.

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 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 Plumbing 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 Plumbing 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.

E. 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.

F. The Plumbing Contractor shall submit the record set for approval by the engineer a minimum of four weeks prior to seeking the permanent certificate of occupancy.

1.09 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.

1.10 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. The work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed nor interfered with. 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.

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. Fire Protection, Plumbing, HVAC, Electrical and any other systems shall be shown and coordinated on these transparencies in the order listed by the respective contractors.

H. This Contractor shall, with the approval of the Owner's Representative and without extra charge, make reasonable modifications in his work as required by normal structural interferences, or by interference with work of other trades, or for proper execution of the work.

1.11 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. 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.

1.12 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. The Plumbing Sub-contractor shall report, in writing, to the Owner's Representative, any conditions which might adversely affect his work.

1.13 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.

1.14 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.

1.15 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.

1.16 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 Electrical work at the site.

1.17 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.

1.18 SCHEDULE

A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.19 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.

1.20 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. 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.

1.21 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. Unless otherwise specified herein, all pipes passing through floors, walls, ceilings or partitions shall be provided with sleeves and rating shall be maintained by installation of fire stopping.

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 can not 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.

1.22 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 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.

1.23 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.

1.24 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.

1.25 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.

1.26 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.

1.27 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 16 - ELECTRICAL.

PART 2 - PRODUCT

2.00 PIPE, FITTINGS AND JOINTS - GENERAL

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.

E. Joints

1. Joints, in cast iron piping up to 6" size above ground, shall be made using a code approved mechanical compression type coupling consisting of a neoprene collar, stainless steel coupling with stainless steel bolts and nuts all assembled to provide seal.

2. Joints, in cast iron pipe 8" and larger above ground and below ground, shall be all Hub and Spigot push-on compression type conforming to ASTM C564-70.

3. Joints in copper tubing, except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fittings and 95-5 tin/antimony solder and non-corrosive flux.

4. Steel, copper and brass pipe and fittings with threaded ends shall have IPS threads cut clean and true and in conformance with the ANSI Specifications B2-1 for taper threads.

5. Joints between steel or copper, and cast iron shall be made with Adapter Fittings screwed or soldered onto the pipe and connected to or inserted into the cast iron pipe hub.

6. Connections between earthenware of any fixture and flanges in soil and waste piping shall be made absolutely gas and watertight with closet setting compounds and gaskets which must be absolutely gas, watertight, and stainproof, containing neither oil nor asphaltum and which will not rot, harden or dry under any extreme climatic change, and must adhere on wet surface.

2.01 DOMESTIC WATER PIPING

A. Service: Domestic hot and cold water, hot water return, tempered water and non- potable water above ground.

Pipe Material: Type L hard drawn copper tubing – ASTM B88.

Fitting Material: Cast brass or wrought copper solder joint fittings.

Joints: Solder joints, 95 / 5 tin-antimony solder (ASTM B-32) or brazed.

2.02 GAS PIPING

A. Service: Natural gas and gas vent piping (2” and smaller).

Pipe Material: Schedule 40 Black Steel pipe.

Fitting Material: Malleable iron threaded.

Joints: Screwed.

Miscellaneous: All above ground exterior gas piping or piping located in a corrosive atmosphere shall be protected by a coating of high density polyethylene or a wrapping of an inert material.

B. Service: Nature Gas (2 ½” and larger)

Pipe Material: Schedule 40 Black Steel pipe

Fitting Material: Welded

Joints: Welded

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 electro-galvanized 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. This Contractor shall 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:

2. 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.

3. Firestopping Rating:

4. 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 PIPING, EQUIPMENT AND VALVE IDENTIFICATION

A. General

1. All pipe markers, bands, valve tags and equipment identification plates 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.

B. Piping

1. Name of the service, taken from drawing legend, shall be printed in black letters, not less than 1 1/4 inches high for piping, including covering, 3 inches and larger and 3/4 inch in height for piping 2-1/2 inches and smaller.

2. Arrows and color band background shall conform to Massachusetts 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.

C. Equipment

1. Nameplates shall be made of black surface white core laminated bakelite with indented letters.

2. Nameplate shall be a minimum of 3 inches wide by 1.5 inches high and bear the equipment name as designated in these Specifications.

3. Equipment identification designations shall be from equipment schedules as indicated on the drawings or specified herein.

D. Valve Tags

1. All valves on pipes of every description with the exception of chrome plated stops at fixtures shall have neat, circular brass valve tags of at least 1.5 inches in diameter, attached with brass hook to each valve stem. Stamp on these valve tags in letters as large as practical the number of the valve and the service such as "H.W.", "C.W.", for hot water, cold water, respectively. The numbers of each service shall be consecutive.

2. All valves on equipment, tanks and pumps shall be numbered by 3 inch diameter red metal discs with white numbers 2 inch high secured to stem of valves by means of brass hooks or small solid link brass chain.

2.06 VALVES (DOMESTIC WATER SYSTEM)

A. General

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. Manufacturer's model numbers used herein are intended as a guide to quality and type of valve to be provided.

1. Valves used for throttling of flow shall be butterfly type with memory stop. Ball valves shall not be acceptable on hot water return piping.

2. Valves shall be provided with Buna-N, TFE or EPDM seats suitable for the service intended.

3. The pressure classification for valves specified herein are working steam or water, oil, gas (WOG) pressure ratings.

4. Lever handles on all valves shall be color coded in conformance with ANSI Standard A-13.1.

5. Shut-off valves on the incoming water service and on the discharge of the water meter shall be a gate valve or other full-way valve.

B. Ball Valves (2" and smaller) shall have threaded or solder ends with a bronze body, full port stainless steel ball an stem, RPTFE seats, a lever handle and be rated for 600 psi WOG. Ball valves shall be equal to Apollo Series 77-140 / 77-240.

C. Butterfly valves, 2.5 inches and larger: Apollo lug type model 143, cast iron body, EPDM or Buna-N seat, 10 position lever handle.

D. Gate valves up to 3" in size shall be a bronze body gate with rising stem, solid wedge design, 300 psi WOG and have threaded or soldered ends. Nibco Models T-134 or S-134.

E. Gate valves 4" and larger shall be a iron body gate outside screw and yoke, solid wedge, bronze mounted with flanged connections. Nibco Model F-617-0.

F. Check valves, 3 inches and smaller: Conbraco 61 series, bronze body, stainless steel spring, RTFE ball check.

G. Drain valves: Apollo 78-100 series ¾ inch all bronze hose end ball valve with cap and chain, provide hose end vacuum breaker.

H. Balancing valves shall be a butterfly valve with bronze body, stainless steel disc and stem equal to Milwaukee "Butterball" Model BB2-100 for threaded ends, and BB2-350 for solder ends.

I. Strainers: Conbraco 59 Series, bronze body, threaded or solder ends to suit, stainless steel screen, 400 pound wog.

2.07 VALVES (NATURAL GAS)

A. General – Valves in the gas piping system shall be as manufactured by Apollo, Milwaukee, Nibco, Walworth Milliken or Nordstrom.

B. For pipe sizes 2-inch and smaller: valves shall be bronze body, UL listed gas service ball valve with screwed end T-handle, and rated for 250 psig LP-Gas. Gas valve shall be equal to Apollo 80 – 100 series.

C. For pipe sizes 2½ inch and larger: valves shall be an iron body lubricated plug valve with flanged ends, valve shall be Walworth 1797F or equal by Milliken Valve Co., Inc. or Nordstrom Valve Co., Inc.

2.08 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 Massachusetts State Building Code, Sixth Edition, Chapter 16.

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. Lateral sway bracing shall not be required on piping supported with rods less than 6” long.

7. 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.

8. C-clamps for attachment to the building structure must be provided with retaining straps.

9. 4-Way bracing may be of the splayed wire type or fixed angle brace with U bolt.

2.09 INSULATION

A. General: The pipe covering specified herein for piping systems shall be provided in strict accordance with the manufacturer's printed instructions, the best practice of the trade and to the full intent of this specification.

1. The sealers, tapes, adhesives and mastics used in conjunction with the installation of the pipe covering specified herein shall possess the maximum possible fire-safe qualities available and shall be of a type approved by Factory Mutual, Factory Insurance Association or National Fire Protection Association.

2. Valves, fittings, flanges and accessories shall have the same thickness of pipe covering applied as the adjacent pipe. Pipe covering for these items shall be factory PVC molded type.

3. Longitudinal seams and butt joint shall be sealed with a fire retardant, vapor barrier adhesive.

4. Insulation at hangers shall be protected with sheet metal saddles.

B. Interior Cold Water, Hot Water, and Hot Water Return System Piping

1. All interior cold water, tempered water, tempered water return, hot water and hot water return piping shall be insulated with a preformed fiberglass insulation which meets the property requirements of ASTM C547, “Standard Specification for Mineral Fiber Pipe Insulation”. Pipe insulation shall have a white, factory applied, fire retardant, reinforced vapor barrier jacket.

   Insulation shall be continuous through sleeves and have a thickness of 1-inch.

2. Ends of insulation at termination points shall be sealed to the pipe with a pre-molded PVC type fitting. Pipe fittings and valves shall be provided with pre-molded PVC covers with fiberglass inserts.

3. Pipe insulation within 6'-0" of finished floor, in exposed installations, shall be provided with 20 mil. PVC continuous covers in addition to the vapor barrier jacket. Fittings and seams shall be solvent welded.

4. Insulation shall be manufactured by Owens-Corning Fiberglas Corp., Knalif Fiberglass, Certainteed or equal.

PART 3 - EXECUTION

3.00 NOT USED

3.01 IDENTIFICATION

A. All equipment and each length of pipe fitting, trap, fixture, control panel, starter, and device used in the systems shall have a permanently attached nameplate or be cast, stamped or indelibly marked with the manufacture's mark or name, the weight, type and class. The nameplates shall be kept clean and readable at all times.

B. Piping

1. Furnish and affix approved adhesive bands identifying the service and direction of flow of each piping system installed under this Section of the Specifications.

2. 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.

3. 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.

4. 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.

5. Bands shall be applied only after any finish painting is completed.

6. 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.

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. 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. Valve numbers and legend on valve tags shall correspond to numbers indicated on the Record Drawings and valve list. Legend shall be taken from Contract Drawings Legend.

E. Valve Charts and Lists:

1. Provide to the Owner through the Architect, two printed detailed valve number lists. These printed lists shall state the numbers and location 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 or valves, when any one valve is to be opened and closed.

2. These printed lists shall be prepared in form to meet approval of the Architect and shall be framed under glass.

3.02 TESTING

A. General

1. All labor, materials, instruments, devices and power required for testing shall be provided by this Contractor. The tests shall be performed in the presence and to the satisfaction of the Architect and such other parties, as may have legal jurisdiction. No piping in any location shall be closed up, furred in, or covered before testing.

2. Where portions of piping systems are to be covered or concealed before completion of the project, those portions shall be tested separately in the manner specified herein for the respective entire system.

3. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Architect shall be retested in part or in whole as directed.

4. The Architect retains the right to request a recheck or resetting of any pump or instrument by this contractor during the guarantee period at no additional cost to the Contractor.

5. Repair, or if directed by the Architect, replace any defective work with new work without extra charge to the Contract. Repeat tests as directed, until the work is proven to meet the requirements specified herein.

6. Restore to its finished condition any work, damaged or disturbed, provided by other contractors and engage the original contractor to do the work of restoration to the damaged or disturbed work.

7. The fixtures shall be tested for stability of support and satisfactory operation. The piping shall be tested when directed by the Engineer for stability.

8. Caulking of screwed joints or holes in piping will not be acceptable.

9. This Contractor shall notify the Architect and any inspectors having jurisdiction, a minimum of 48 hours in advance of making any required tests so that arrangements may be made for their presence to witness his scheduled tests.

B. Specific:

1. Cold, Hot, and Hot Water Return Piping Systems:

   a. Upon completion of the roughing-in and before setting fixtures and final connection to all equipment, all water piping systems shall be tested to a hydrostatic pressure of 150 PSIG.

   b. Each system's test shall be maintained for eight hours without a drop in pressure.

   c. After testing, provide complete adjustment of all parts of each water system until design distribution or balancing is obtained throughout.

2. Gas Systems

   a. Before any system of gas piping is put into service, it shall be carefully tested in the presence of, and with the approval of, the gas inspector to insure that it is gastight. Where any part of the system is to be enclosed or concealed, this test shall precede the work of closing in the piping. The test medium shall be air or inert gas (e.g. nitrogen, carbon dioxide). Oxygen shall never be used.

   b. Gas piping systems, not in excess of ½ psig or 14 inches water column, extending from the outlet of the meter set assembly to the closed shutoff valve of each appliance, shall withstand a pressure of at least six inches mercury or three pound gauge for a period of not less than 10 minutes without showing any drop in pressure. Pressure shall be measured with a mercury manometer or slope gauge, or an equivalent device so calibrated as to be read in increments of not greater than 1/10 pound. The source of pressure shall be isolated before the pressure tests are made.

c. After the test of piping for tightness as described herein, gas may be turned on and appliances tested at normal operating pressure by means of a soap bubble test, or other non-corrosive foaming agent test.

3.03 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.

3.04 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.

3.05 SYSTEMS

A. Cold, Hot, and Hot Water Return Piping

1. Vacuum breakers and/or backflow preventers shall be installed on supplies to each piece of equipment, and valved connection, as required, to prevent back-siphonage and backflow.

2. Branch lines from water service or main lines shall be taken off the top or bottom of main, using such crossover fittings as may be required by structural or installation conditions. All water service pipes, fittings, and valves shall be kept a sufficient distance from other work and not less than one inch between coverings on the different services.

3. Provide shock absorbers at equipment, tops of the risers, at each individual or each group of fixtures as required to prevent water hammer. Air chambers will not be accepted.

4. Water piping shall be run parallel and graded evenly to the drainage points. There shall be a minimum 1/2" hose-end drain valve with hole-end vacuum breaker provided for each low point in the piping, so that all parts of each water system can be drawn-off. Piping 2" and larger shall have a 3/4" size drain valve.

5. Provide suitable means of thermal expansion for the hot water piping using swing joints, expansion loops and long-turn offsets as required to suit building conditions.

6. All piping connections to equipment shall be provided with unions or flanges to permit convenient disassemble for alterations and repairs.

7. No piping shall be installed in a manner to permit back siphonage or backflow of any flow of water from the waste non-potable or process system into the domestic water systems or their distribution piping under any conditions. Approved backflow preventers shall be installed where cross-connections are required.

8. Where flanges are installed in the water systems, install red rubber gaskets between each pair of flanges.

9. Heating and/or bending of copper tubing to eliminate the installation of fittings will not be permitted (exception: flexible risers between fixture stop and kitchen/lavatory faucet).

10. Piping systems shall be kept clean during all phases of work. Open ends of incomplete piping shall be protected to prevent the entrance of foreign materials.

11. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.

12. Provide copper plated friction clamps on the cold water supplies to each water closet and urinal flushometer. Friction clamp shall be firmly clamped to the pipe and shall be firmly attached to the adjacent wall structure.

3.06 PATCHING, REPLACEMENT AND MODIFICATION OF EXISTING WORK

A. After installation of pipe lines, the Contractor shall 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.

3.07 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. It shall be possible to drain the water from all sections of each sprinkler cold, and hot water piping system. Pitch piping back to drain valves.

7. Screwed piping of brass or chrome plated brass shall be made up with special care to avoid marring or damaging pipe and fitting exterior and interior surfaces.

8. Small fittings shall be 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.

9. Screwed pipe and copper tubing shall be reamed smooth before installation.

10. All exposed piping in connection with fixtures and where exposed on finished walls or to view, shall be chrome plated. Where chrome plated piping is installed, cut and thread pipe so that no unplated pipe threads are visible when the work is completed.

11. Reducing fittings, unless otherwise approved in special cases, shall be provided in making reduction in size of pipe. Bushings will not be allowed unless specifically approved.

12. Remove and replace with new materials, any copper or brass piping (chrome plated or unplated) and valves showing visible tool marks.

13. Vertical risers shall be firmly supported by riser clamps, properly installed to relieve all weight from the fittings.

14. Any piece of pipe six inches or less in length shall be considered a nipple.

15. All water service piping shall be kept a sufficient distance from other work to permit finished covering to be not less than 1 inch from other work.

16. 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. 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:

MATERIAL	Steel	Copper	PVC
Pipe Size (Inches)	SCHEDULE		
.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, this Contractor shall 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.

C. 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.

D. 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. Field drilling for inserts required for work under this section of the specifications shall be provided by this Contractor.

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.

E. Valve Installation

1. Location of Valves: There shall be valves where indicated on the drawings and where specified as follows:

   a. At building service entrances, 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.

F. Installation of Gauges and Thermometers

1. Thermometers and pressure gauges shall be installed in such a manner as to cause a minimum restriction to the flow in the pipe and so that they can be easily read from the floor.

2. Thermometers shall be installed in the outlet piping from each hot water heater, and as shown on drawings to verify heat maintenance system operation.

3. Pressure gauges in the domestic water system shall be installed at outlet side of the water meter and reduced pressure backflow preventer and at inlet and outlet sides of pressure reducing valve station.

END OF SECTION

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SECTION 15500
HEATING, VENTILATING AND AIR CONDITIONING

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

Work includes the replacement of (1) Steam Boiler, (1) boiler feed system and supporting systems and new air compressor.

A. Refer to the specific requirements for this project included in the "Narrative Report for Compliance with Section 1301.8.4.1 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.

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)
2. Pipe Hangers and Supports
3. Identification
4. Valves and Hydronic Accessories (all types)
5. Steam Traps
6. Pressure Gauges, Thermometers, Strainers, Accessories
7. Boiler/Burner Units
8. Vibration Isolation
9. Unti Heater (Steam)
10. Ductwork
11. Fans
12. Insulation
13. Chimneys, Stacks, and Flues
14. Fuel Oil Piping
15. Boiler Feed Systems
16. Relocation of existing HVAC components that interfere with new construction and removal and disposal of obsolete components.
17. Operating and maintenance instructions and manuals
18. Shop drawings
19. Record (as-built) Drawings

20. HVAC Control Systems

21. Seismic Restraints

22. Air Compressor

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 equipment.

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. Concrete work including concrete housekeeping pads and blocks for vibrating and rotating equipment, and cast-in-place manholes.

6. Flashing of roof and wall penetrations.

7. Painting.

1.03 PRODUCTS FURNISHED, BUT NOT INSTALLED UNDER THIS SECTION

A. Furnish pipe sleeves for placement into formwork by the General Contractor.

B. Furnish access panels and doors for installation by the General Contractor.

1. Furnish access panels for installation in walls, ceiling and floors at locations to permit access for adjustment, removal, replacement and servicing of all concealed equipment, valves and materials installed under this Section of the specifications.

2. Access panels will be installed under the Section of the related trades of the finished surfaces in which they are located.

3. Access panels shall be located in closets, storage rooms and/or other non-public areas if possible, positioned so that the equipment can be easily reached, and the size shall be sufficient for this purpose (min. 16" x 16"). When access panels are required in corridors, lobby or other habitable areas, they will be located as directed by the Owner’s Representative.

4. Access panels shall be prime painted, keyed alike and provided with cylinder lock and two keys for each panel. Units shall be manufactured by Milcor, Inland Steel, Miami Carie or approved equal. Required fire resistance of walls and ceilings shall be maintained.

C. Furnish line voltage fan speed control switches for installation by the Electrical Subcontractor.

D. Furnish and mount line voltage aquastats for wiring by the Electrical Subcontractor.

1.04 DEFINITIONS

A. As used in this Section, the following terms shall be understood to have the following meaning:

1. **"Work"** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.

2. "**Concealed**" shall mean hidden from sight in chases, furred in spaces, shafts, embedded in construction, in a crawl space, and above hung ceilings.

3. "**Exposed**" shall mean not installed underground or concealed as defined above.

4. "**Furnish**" shall mean purchase and deliver to the project site, complete with every necessary appearance and support.

5. "**Install**" shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting, proper location and operation in the project.

6. "**Provide**" shall mean furnish and install.

7. "**Piping**" shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.

8. "**Furnished by others**" shall mean materials or equipment purchased and set in place under other sections of the general contract and connected to the systems covered by this section of the specifications by this trade contractor.

9. "**Coordinate**" shall mean all work provided under this section of the specification shall be in compliance with work of other trades.

10. "**HVAC Contractor**," "**Subcontractor**," or "**Installing Contractor**" shall be the Subcontractor responsible for the Work of this Section of the Specifications, and shall be responsible for coordination of the Work of this Section of the Specifications with the Work of Section 15900, **BUILDING AUTOMATION SYSTEM** where applicable.

11. "**ATC**" shall mean Automatic Temperature Controls, and shall be interchangeable with Building Automation System.

12. "**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.

13. "**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.

1.05 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, pumping, process piping and refrigeration 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, or

2. 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. American Boiler Manufacturers Association (ABMA)

2. American National Standards Institute (ANSI)

3. American Petroleum Institute (API)

4. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE)

5. American Society of Mechanical Engineers (ASME).

6. American Society of Testing and Materials (ASTM)

7. American Welding Society, Inc. (AWS)

8. Factory Mutual System (FM)

9. Institute of Electrical and Electronics Engineers (IEEE)

10. Manufacturer's Standardization Society of the Valve & Fitting Industry (MSS)

11. National Electrical Contractors Association (NECA)

12. National Electric Manufacturers Association (NEMA)

13. National Environmental Balancing Bureau (NEBB)

14. North American Insulation Manufacturer's Association (NAIMA)

15. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)

16. The Hydronics Institute (HI)

17. Thermal Insulation Manufacturer’s Association (TIMA)

F. The date of the code or standard is that in effect at the Bid date.

G. 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.

1.06 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.

1.07 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 HVAC Subcontractor 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.

1.08 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 piping, 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 air handling unit must deliver equal CFM against equal external static pressure (with the allowed pressure drop of dirty filters) using equal or less horsepower as the air handler 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 rooftop mounted equipment and 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, and for diffusers – 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. Sheet metal drawings shall show elements of Architect's reflected ceiling plan, exposed ductwork, walls and partitions (highlighting fire walls and smoke partitions), diffusers, registers. Grilles, fire and smoke dampers, sleeves and other aspects of construction as necessary for coordination.

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, cooling water and compressed air 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 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 and Fittings (all services, types, and joining methods)

2. Pipe Hangers and Supports

3. Sleeves, Firestopping

4. Valves and Hydronic Accessories (all types)

5. Steam Traps

6. Pressure Gauges, Thermometers, Strainers, Accessories

7. Fuel Oil Transfer Pumps and Systems

8. Boiler/Burner Units

9. Vibration Isolation

10. Complete ductwork, equipment layout, and piping shop drawings, construction details and construction standards

11. Boiler Feed System

12. Fans

13. Insulation

14. Chimneys, Stacks, and Flues

15. Operating and maintenance instructions and manuals

16. HVAC Control Systems

17. Seismic Restraints

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in an individual (combined) submittal.

1. Access panel shop drawings shall be submitted to the Construction Supervisor for approval.

2. Do not submit multiple product information in a single bound manual.

3. 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 subcontractor 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. 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. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. INFORM SUBCONTRACTORS, 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.

1.09 OPERATION AND MAINTENANCE (O&M) DATA

A. Commence preparation of the Operating and Maintenance manuals immediately upon receipt of “Approved” or “Approved as Noted” shop drawings and submit each section within one month. The last submission shall be no later than two months prior to the date of Substantial Completion of the Project.

B. The manual shall consist of (3) sets of manuals and include (3) CDs, which shall contain the scanned content of the entire manual. The manual shall be submitted for review prior to creation of the CDs.

C. 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. Provide as part of each package, lubricating charts indicating equipment tag number, location, equipment service, greasing and lubricating requirements, lubricants, and intervals.

c. 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.

d. 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.

e. 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.

D. Provide O&M manuals for each of the following as a minimum:

1. Valves and Hydronic Accessories (all types, including charts for all balancing valves)

2. Steam Traps

3. Boiler Feed Pumps

4. Boiler/Burner Units

5. Vibration Isolation

6. Fans

7. Unit Heaters (all types)

8. Boiler Feed System

9. Air Compressor

1.10 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.

E. Record Drawings, shall show "as-built" condition of all plans, details, sections, piping diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer model numbers and capacities of final installed equipment.

F. The HVAC Contractor shall submit the record set for approval a minimum of two 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 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.

1.12 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 Architect 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. 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.

1.13 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.

1.14 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.

1.15 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.

1.16 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.

1.17 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.

1.18 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.

1.19 SCHEDULE

A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.20 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.

1.21 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 this 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.

1.22 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. Unless otherwise specified herein, all pipes passing through floors, walls, ceilings or partitions shall be provided with sleeves and rating shall be maintained by installation of fire stopping.

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 can not 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.

1.23 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.

1.24 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. Recovered refrigerant shall be recycled by a licensed facility approved by the Owner's Representative.

C. Removed equipment or fluids containing any hazardous materials such as ethylene glycol, oil or chromate shall be recycled by a licensed facility approved by the Owner's Representative.

D. Where it has been identified that asbestos-containing material exists within the scope limits, refer to the Asbestos Abatement specification section for requirements.

1.25 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.

1.26 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.

1.27 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. 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.

1.28 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.

PART 2 - PRODUCTS

2.00 NOT USED

2.01 PIPING AND FITTINGS

A. Piping, tubing, and fittings shall be as follows:

1. Low temperature (35 – 250 degrees) water piping shall be standard weight (Schedule 40 through 12", 0.375" thick wall for larger) black steel with cast iron, malleable iron or steel fittings, or Type L hard drawn copper tubing with wrought copper fittings, brazed, 95-5 soldered, or silver soldered (as indicated below) conforming to ASTM B-32, or flared-tube joint fittings.

2. Steam pipe shall be Schedule 40 black steel with malleable iron or steel fittings.

3. Condensate return piping shall be seamless Schedule 80 black steel with cast iron or malleable iron fittings, Class 250 minimum.

4. Condensate drain piping shall be Type-L hard drawn copper with wrought copper fittings, 95/5 soldered and shall conform to ASTM B-32.

5. Low temperature water piping (hot, chilled and condenser):

   a. 2 inches and under piping shall be either:

      1) Type-L hard drawn copper with wrought copper fittings, 95/5 or silver soldered (for systems up to 200 degrees F and 200 psi), or brazed (for higher temperature/pressure systems). Solder shall conform to ASTM B 32. 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, or

      2) Threaded Schedule 40 black steel with cast iron or malleable iron fittings.

   b. Unions for pipes 2 inches and under shall be bronze (for copper piping) or steel (for steel piping), ground joint, 600-psi wog, sweat or thread end as required.

   c. 2-1/2 inches and larger piping shall be Schedule 40 black steel, with butt welding fittings.

6. Steam pipe shall be Schedule 40 black steel with malleable iron or steel fittings.

7. Condensate return and blowdown piping shall be seamless Schedule 80 black steel with cast iron or malleable iron fittings, Class 250 minimum.

8. Cold water make-up piping shall be Type L hard drawn copper, ASTM B88.

   a. Fittings shall be wrought copper ANSI B16.22, joints made with silver solder. Silver solder shall conform to FS QQ-B-654.

   b. Unions shall be bronze, ground joint, 600-psi woq, sweat or thread end as required.

   c. Joints shall be ASTM B32.

9. Natural gas piping shall be ASTM A53 Schedule 40 black steel, with threaded malleable iron fittings. Unions shall be malleable iron, ground-joint, thread ends, 600-psi wog.

10. Vent piping shall be Schedule 40 black steel with black malleable iron fittings.

B. Steel pipe shall conform to ASTM A 53 or ASTM A 106, Grade A or B, black steel, Schedule 40, unless otherwise specified. Steel pipe to be bent shall be ASTM A 53, Grade A, standard, or Grade B, extra strong weight. Gas, refrigerant, steam and steam condensate pipe shall be ASTM A 53 Grade A.

C. Fuel Oil Piping and Fittings

1. Above Grade - Single Wall:

   a. Piping: Seamless steel A53, A105, A120 or ERW A53E. Threaded joints shall be Schedule 80, welded joints shall be Schedule 40.

   b. Fittings: Steel, beveled butt-weld ends, ASTM A234, ANSI B169, same schedule as adjoining pipe, all elbows long radius, all interior surfaces smoothly contoured. Threaded fittings shall be malleable iron, 300 PSI Class, ASTM A47, or forged or rolled steel, ASTM A234.

   c. Unions: Malleable iron, 300 PSI Class, brass seat, ANSI B16.39, or 2,000 pound forged steel, ASTM A105.

   d. Joints: Welded for piping 2-1/2 inches and above, threaded or butt-welded for pipe 2 inches and below.

   e. Flanges: Forged steel welding neck, as specified for heating hot water system.

D. Gauge piping shall be copper tubing for steam and low temperature water or black steel, ASTM A 106, seamless, Grade A pipe for high temperature water.

E. Copper tubing shall conform to ASTM B 88, Type K or L. Tubing for compressed air tubing shall conform to ASTM B 251.

F. Malleable iron pipe fittings shall conform to ASME B16.3, type required to match adjacent piping.

G. Cast iron pipe fittings shall conform to ASME B16.1 or ASME B16.4 type required to match adjacent piping. Cast iron fittings shall not be used on medium or high temperature water, fuel oil, gas, refrigerant, steam, steam condensate or vent piping.

H. Steel pipe fittings shall have the manufacturer's trademark affixed in accordance with MSS SP-25 so as to permanently identify the manufacturer.

1. Welded fittings shall conform to ASTM A 234 with WPA marking. Butt-welded fittings shall conform to ASME B16.9, and socket welded fittings shall conform to ASME B16.11.

2. Flanged mechanical fittings shall be of malleable iron conforming to ASTM A 47, Grade 32510, or ductile iron conforming to ASTM A 536, Grade 65-45-12. Fittings may also be constructed of steel, conforming to ASTM A 106, Grade B or ASTM A 53.

I. Fittings for copper tubing shall be wrought copper and bronze fittings conforming to ASME B16.22 and ASTM B 75. Cast copper alloy fittings shall conform to ASME B16.18. Flared fittings shall conform to ASME B16.26 and ASTM B 62. Adapters may be used for connecting tubing to flanges and threaded ends of valves and equipment. Extracted brazed tee joints produced with an acceptable tool and installed as recommended by the manufacturer may be used.

J. 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) and shall have the manufacturers trademark affixed in accordance with MSS SP-25. Flange material shall conform to ASTM A 105. Flanges for high temperature water systems shall be serrated or raised-face type. Blind flange material shall conform to ASTM A 516 cold service and ASTM A 515 for hot service. Bolts shall be high strength or intermediate strength with material conforming to ASTM A 193.

K. 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.

L. Polyethylene tubing shall be low-density virgin polyethylene conforming to ASTM D 1248, Type I, Category 5, Class B or C.

M. Pipe threads shall conform to ASME B1.20.1.

N. Nipples shall conform to ASTM A 733 or ASTM B 687, standard weight.

O. Unions shall conform to FS WW-U-531 or FS WW-U-516, type to match adjacent piping.

P. Adapters for copper tubing shall be brass or bronze for soldered fittings.

Q. Dielectric Unions shall conform to the tensile strength and dimensional requirements specified in FS WW-U-531. Unions shall have metal connections on both ends to match adjacent piping. Metal parts of dielectric unions shall be separated so that the electrical current is below 1 percent of the galvanic current that would exist upon metal-to-metal contact.

R. Flexible pipe connectors shall be designed for 175 psi (up to 170 degrees F) and 150 psi (between 170 and 250 degrees F) service as appropriate for the static head plus the pumping head. Connectors shall be installed where indicated. The flexible section shall be constructed of EPDM, rubber, tetrafluoroethylene resin, or corrosion-resisting steel, bronze, monel, or galvanized steel. Materials used and the configuration shall be suitable for the pressure, vacuum, temperature, and circulating medium. The flexible section may have threaded, welded, soldered, flanged, grooved, or socket ends. Flanged assemblies shall be equipped with limit bolts to restrict maximum travel to the manufacturer's standard limits. Unless otherwise indicated, the length of the flexible

connectors shall be as recommended by the manufacturer for the service intended. Internal sleeves or liners, compatible with circulating medium, shall be provided when recommended by the manufacturer. Covers to protect the bellows shall be provided where indicated.

2.02 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 30° 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)	Max Spacing (feet)
Up to 1	6
1¼-2½	9
3-6	12
8 and up	15

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 a maximum hanger spacing of 5’ for tubing up to 1-¼” and 10’ for 1½” and larger. Maximum spacing for PVC pipe hangers shall be 4’.

G. Branch piping and runouts of over 5 feet shall have at least one hanger or support.

H. At all copper piping, provide pipe supports with copper finish to eliminate the possibility of galvanic action.

I. 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.

J. Hangers and supports shall provide for 2" of vertical adjustments.

K. 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.

L. 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

SCHEDULE OF PIPE HANGER ROD SIZES		
Pipe sizes (inches)	**Single rod diameter (inches)**	**Double rod diameter (inches)**
6	¾	5/8
8 – 12	N/A	7/8
14 – 18	N/A	1
20	N/A	1¼
24	N/A	1-½

M. Pipe covering protection saddles shall not be loaded to more than 80% of maximum loading as rated by the manufacturer.

N. 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.

O. 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.

P. Rods, clamps and hangers shall be electro-galvanized coated.

Q. 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.

R. 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. Structural Wood Framing: Submit details for approval.

4. 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.

S. All hangers and shields exposed to the exterior shall be galvanized steel and PVC coated to manufacturer's standard thickness.

2.03 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, Flintguard 120-13 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.

3. For floors in mechanical equipment rooms, and similar areas where a water dam is required, use machine cut and reamed standard weight steel piping set flush to underside of structure and extending 6 inches above finished floor.

4. For other floors, use 18 gauge rolled and tack welded galvanized steel, or machine cut and reamed plastic pipe or standard weight steel piping set flush to both finished surfaces. Refer to Room Finish Schedule.

5. Cover pipe sleeves in walls and ceilings of finished areas other than equipment rooms with satin finish stainless steel, or satin finish chrome or nickel plated brass escutcheons, with non-ferrous set screws. Do not use stamped steel split plates. Split cast plates with screw locks may be used.

6. In non-rated walls, escutcheon plates shall be of adequate size to allow for piping with full insulation to pass through the wall uninterrupted. The interior diameter of the plate shall fit snugly around the outside diameter of the insulation.

D. Duct sleeves shall be minimum 18 gauge galvanized steel. Provide adequate bracing for support of sleeves during concrete and masonry work. For fire rated floors and walls, build fire dampers into structure to attain fire rated construction, in a manner acceptable to the local and state authorities.

E. Cover exposed duct sleeves in finished areas with 18 gauge galvanized steel plates in the form of duct collars. Fix in position with non-ferrous metal screws.

2.04 FIRESTOPPING

A. 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: 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: 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.

2.05 VALVES AND STRAINERS FOR WATER, STEAM, AND FUEL OIL SYSTEMS

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.

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 (125 psig gate, 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 union adjacent to equipment end of all threaded and soldered 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; butterfly valves for water systems or gate valves for steam and condensate systems.

   b. In general, for piping smaller than 2½" use threaded or sweat connections; ball valves for water, fuel oil, and glycol systems or gate valves for steam and condensate.

2. Throttling/Balancing Valves (provide for bypass of 3-way valves and where shown on the drawings):

   a. In general use combination balancing (with flow measurement) and shut-off valves (circuit setter type) or plug valves (for higher pressure/temperature limits) for water and glycol systems and globe valves for steam and condensate. Triple duty valves (balancing with flow measurement, shut-off, and check valve) can be used where shown on the drawings and allowed in the tables on pump discharges.

3. 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.

4. Drain Valves and Manual Vent Valves

   a. Globe with plug-type disc or ball valves (as shown on drawings).

5. Vacuum Breakers

   a. Vacuum breakers shall be swing-check valves with 15-degree seat angle Provide at least one vacuum breaker for each steam coil and heat exchanger.

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 Walworth, Stockham, Milwaukee, Jenkins, Crane, Nibco, Hammond, or Grinnell.

D. Globe Valves (including angle 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-85, 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 Walworth, Stockham, Milwaukee, Jenkins, Crane, Nibco, Hammond, or Grinnell. For areas where clearances are restricted, non-rising stems may be used – contractor shall indicate locations on submittal.

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. Valves shall be as manufactured by Walworth, Stockham, Milwaukee, Jenkins, Crane, Nibco, Hammond, or Grinnell. 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 be as manufactured by Conbraco Industries (Apollo), Watts, Stockham, Grinnell, 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.

G. Butterfly Valves: Provide butterfly valves of the type and materials listed in the tables. Valve necks shall allow a minimum of 2” insulation. Valves shall have the trim required to meet the listed pressures and temperatures listed in the tables. Valves shall have visual position indication. Valves 6” and larger and all steam valves shall be gear operated. Non-steam valves under 6” shall be lever operated with balance stops.

1. General Service: Standard lug type with ductile iron body, resilient EPDM seats, bronze or Nylon 11 coated ductile iron disc and 416 stainless steel stem. Valves shall comply with MSS SP-25, MSS SP-67, and API-609. Valves shall be as manufactured by Mueller, Centerline, DeZurik, Grinnell, Nibco, Hammond, Keystone, Bray Model 31H, or SF Equipment.

2. High Performance: Valves shall have lug-style carbon steel body, 316 stainless steel eccentric disc, offset 17-4 PH stainless steel shaft, and filled PTFE soft seat. Valves shall comply with ANSI B16.5, ANSI B16.34, MSS SP-25, MSS SP-61 (zero leakage), MSS SP-58, and API-609. Valves shall be as manufactured by Flowseal (Crane), Neles-Jamesbury, DeZurik, Posi-Seal, or Bray/McCannalok.

3. High Performance (Triple Offset): Valves shall have double flange carbon steel body, 316 stainless steel disc, 17-4 PH stainless steel shaft, and 316 stainless steel metal seat (may be laminated graphite). Valves shall comply with ANSI B16.5, ANSI B16.34, ISO 5752, MSS SP-25, API-6D (zero leakage), and API-609. Valves shall be as manufactured by Adams Type MAK, Flowseal TOV (Crane), Tomoe Tritec, Vanessa (Tyco) Series 30,000, or Saunders MS (Alfa Laval) Model GI.

H. Plug Valves: Steel valves shall conform to ANSI B16.34, ANSI B16.5, and ANSI B16.10 of the type and materials required for the pressure class and body connection type listed in the tables. Valves shall be lubricated plug type as manufactured by Walworth or approved equal.

I. Combination Balancing and Shutoff Valves

1. Furnish and install circuit balancing valves as shown on plans and in accordance to manufacturer's installation instructions. Valve size shall match pipe size. Valves shall provide three functions: precise flow measurement, precision flow balancing, and positive drip tight shut off. Valves shall be as manufactured by Bell & Gossett, Mepco, Flowset, Tour Anderson, Taco, Nexus, or Armstrong.

2. Each valve shall have two 1/4" NPT brass metering ports with Nordel or EPDM check valves and gasketed caps located on both sides of valve seat. Two additional 1/4" NPT connections with brass plugs are to be provided on the opposite side of the metering ports for use as drain connections. Drain connections and metering ports are to be interchangeable to allow for measurement flexibility when valves are installed in tight locations.

3. An integral pointer shall register degree of valve opening. Valves shall be calibrated so that flow in gpm can be determined when valve opening in degrees and pressure differential across valve is known. Valve hand-wheel shall have memory lock feature that will provide a means for locking the valve position after the system is balanced.

4. 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.

5. 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.

6. Provide one portable differential meter suitable for the operating and differential pressures specified and required, complete with hoses, vent, and carrying case.

J. Triple Duty Pump Discharge Valves

1. Furnish and install multi-purpose valves as shown on plans and in accordance to manufacturer's installation instructions. Valve size shall match pipe size. Valves shall provide four functions: precise flow measurement, precision flow balancing, non-slam check valve, and positive drip tight shut off. Valves shall be as manufactured by Bell & Gossett, Flowset, Taco, or Armstrong.

2. Each valve shall have two 1/4" NPT brass metering ports with Nordel or EPDM check valves and gasketed caps located on both sides of valve seat. Two additional 1/4" NPT connections with brass plugs are to be provided on the opposite side of the metering ports for use as drain connections. Drain

connections and metering ports are to be interchangeable to allow for measurement flexibility when valves are installed in tight locations.

3. An integral pointer shall register degree of valve opening. Valves shall be calibrated so that flow in gpm can be determined when valve opening in degrees and pressure differential across valve is known. Valve type shall be one of the types listed for the service in the table. Valve hand-wheel shall have memory lock feature that will provide a means for locking the valve position after the system is balanced.

4. 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.

5. 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.

6. Provide one portable differential meter suitable for the operating and differential pressures specified and required, complete with hoses, vent, and carrying case.

K. 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.

L. 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.

M. Pressure Relief Valves

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 chiller refrigerant relief and steam relief valves to the outdoors as indicated. Valves shall be as manufactured by Watts, Kunkle, Lonergan, or Lunkenheimer.

N. 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.

O. 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.

P. 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.

CHILLED, CONDENSER, HOT, AND COLD WATER, AND GLYCOL AND FUEL OIL SERVICES Maximum 250°F 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 Modulation (with C_v selected at 70% open)	Iron/EPDM	Flanged (ANSI 125/ 150)	175 psig CWP (Cold Water Working Pressure) Bi-directional. 150 psig dead end service.
Butterfly	14" - 48"	General Service	Isolation or ATC Modulation (with C_v selected at 70% open)	Iron/EPDM	Flanged (ANSI 125/ 150)	150 psig CWP (Cold Water Working Pressure) Bi-directional.
Gate	½" – 2"	Rising stem	Isolation (Fuel Oil)	Bronze/Bronze	Threaded	ANSI Class 125
Globe	½" – 2"	Control	ATC Modulation	Bronze/Brass	Threaded	ANSI Class 125
Plug	Not	Used				
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" - 24"	Silent Globe	Pump discharge	Iron/Bronze or Brass	Flanged	ANSI Class 125
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 353°F 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 Per-formance	Isolation or ATC open-close (non-modulated)	Steel/Filled PTFE	Flanged	ANSI Class 150 with zero leakage bi-directional
Butterfly	2½" - 24"	High Per-formance (Triple Offset)	Isolation or ATC Modulation (with C_v selected at 70% open)	Steel/Stainless	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 - Rising stem	Balancing or ATC Modulation	Bronze/Bronze	Threaded	ANSI Class 125
Globe	2½" - 12"	Bolted Bonnet - Rising stem	Balancing or ATC Modulation	Iron/Bronze	Flanged	ANSI Class 125
Plug	Not	Used				
Balancing/Shutoff	Not	Used				
Triple Duty	Not	Used				
Check	To 1½"	Silent Wafer	Not Used			
Check	2" – 24"	Silent Globe	Not Used			
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" - 4"	Y-type	Piping	Iron/Stainless 3/64" screen	Flanged	ANSI Class 125
Strainer	5" – 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
Strainer	2" – 16"	Suction Diffuser	Not Used			

2.06 COLD WATER CONNECTIONS

Connections shall be provided which include consecutively in line a strainer, backflow prevention device, and water pressure regulator. The backflow prevention device shall be provided as indicated and in compliance with Section 15400 PLUMBING, GENERAL PURPOSE.

A. Strainers: Basket or Y-type strainers shall be the same size as the pipelines in which they are installed. Strainer bodies shall be rated for [125] [250] pound) service, with bottoms drilled and plugged. Bodies shall have arrows cast on the sides to indicate the direction of flow. Each strainer shall be equipped with a removable cover and sediment basket. Basket shall not be less than 22 gauge and shall have perforations to provide a net free area through the basket of at least four times that of the entering pipe.

B. Pressure Regulating Valve: shall be a type that will not stick nor allow pressure to build up on the low side. Valve shall be set to maintain a terminal pressure approximately 5 psi in excess of the static head on the system and shall operate within a 20 psi variation regardless of initial pressure and without objectionable noise under any condition of operation.

2.07 STEAM TRAPS

A. Float Traps: capacity, working pressure, and differential pressure of the traps shall be as indicated.

B. Float-and-Thermostatic Traps: shall be designed for a steam working pressure of approximately 15 psig, but shall operate with a supply pressure of approximately 5 psig. The capacity of the traps shall be as indicated. 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. Bucket Traps: shall be inverted or vertical bucket type with automatic air discharge. Traps shall be designed for a working pressure of 150 psig, but shall operate under a steam supply pressure of approximately 40 to 100 psig as required. Each trap shall have a heavy body and cap of fine-grained, gray cast iron. The bucket shall be made of brass; the mechanism of hard bronze; the valve and seat of stainless or monel; or each of equivalent material. Traps shall be tested hydrostatically under a pressure of 200 psig. Traps shall have capacities as indicated when operating under the specified working conditions. A strainer shall be installed in the suction connection of each trap. Impact operated traps, impulse-operated traps, or thermodynamic traps with continuous discharge may be installed in lieu of bucket traps, subject to approval. Thermostatic traps designed for a steam working pressure suitable for the application may be furnished in lieu of the traps specified above. Thermostatic traps shall be equipped with valves and seats of stainless steel or monel metal, and shall have capacities based on a pressure differential not in excess of the following:

Steam Working Pressure, psi	Differential, psi
25-50	20
90-100	80

2.08 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.

2. Up to 7 feet above finished floor: provide 4½" diameter gauges; over 7 feet above finished floor: 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.

5. Gauge Schedule: Provide at locations indicated on drawings. Shop drawing submittal package to include location, size of gauge and range.

6. Manufacturers: Ashcroft Dresser Ind., Ametek/U.S. Gauge Division, Marsh Instruments, Weiss, 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 gauge with 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 as manufactured by Taylor Instrument Co., Ametek/U.S. Gauge Division, Ashcroft Dresser Ind., Marsh Instrument, Weiss, Trerice, or approved equal.

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, 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. Provide 1 percent accuracy at mid-range.

3. Scale: Heating Hot Water [40] to [240] °F.

Chilled Water [30] to [180] °F.

Condenser [30] to [180] °F.

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.

2.09 BOILER-BURNER UNIT

A. Provide cast iron dual-fuel fired steam boilers and burners as scheduled with all required operating and safety controls (including those shown on the drawings and as by the manufacturer). Units shall be as manufactured by Smith, Burnham Corp. DeDietrich or approved equal.

B. Units shall meet requirements of:

1. American National Standard Institute - ANSI Z21.13-1989 Standard for Gas-Fired Low Pressure Steam and Hot Water Boilers; ANSI Z223.1 (NFPA 54-1988) for Gas-Fired Boilers; and National Electrical Code (NFPA 70).

2. American Society of Mechanical Engineers (ASME) Section IV of the Boiler and Pressure Vessel Code, Rules for the Construction of Heating Boilers.

3. American Society of Mechanical Engineers (ASME) Section VI of the Boiler and Pressure Vessel Code, Recommended Rules for the Care and Operation of Heating Boilers.

4. Hydronics Institute (HI) - Testing and rating Standard for Cast Iron and Steel Heating Boilers and the (Minimum Efficiency Standards of) National Appliance Energy Conservation Act of 1992, effective 1 January, 1994.

5. UL 795-1989 Gas Burners, as applicable.

C. Boilers:

1. Each Boiler shall be furnished as a knocked down unit for field erection in strict accordance with the manufacturer's instructions and recommendations. Multiple "U" steel channels shall be supplied to provide level support for the Boiler(s) when shimmed and grouted to the concrete pad. Steel "L" shaped angle irons shall not be acceptable for floor rails. Provide four hold down bolts of at least 5/8-inch diameter into the concrete and fastened through the steel base channels of the Boiler.

2. Boiler shall be equipped with a flange mounted flame retention type, forced draft Burner designed and tested for a minimum of 82% combustion efficiency based on I=B=R testing procedure to meet ASHRAE 90.1 and the National Energy Policy Act of 1992 requirements.

3. Burner mounting plate shall be lined with lightweight refractory insulation and shall have a built-in observation port with cover. Installing Contractor shall furnish and install pipe and pedestal for each Burner to provide additional floor support.

4. Boiler shall be constructed of cast iron sections utilizing wet base design and not require a refractory combustion chamber. Sections shall have pin like projections evenly spaced on the vertical flue surfaces to extract maximum heat from the hot flue gases. Blowoff/skimmer tapping shall be provided in the back section.

5. Boiler shall be constructed for a minimum 50 PSI water working pressure or more as scheduled in accordance with the ASME Section IV Rules for Construction of Heating Boilers. Individual sections shall have been subjected to a hydrostatic pressure test of 200 PSIG at the factory before shipment and they shall be marked, stamped or cast with the National Board Standard.

6. Boiler sections shall be surface ground to ensure smooth positive mating surfaces with no high spots and machined cast iron nipples <u>must</u> be utilized to assemble the Boiler. Use of Carbon/Graphite composition "O-rings" or rubber/neoprene compound gaskets, which are susceptible to damage from over compression, water side oil based cleaners, pipe thread compounds, chemical water treatments, anti-freeze and flue gas corruption, to seal waterways between the sections shall be prohibited.

7. A permanent pressure-tight furnace seal shall be achieved with the application of a high temperature silastic sealant in a finished ground groove between sections eliminating the need for glue and braided rope wicking. Boiler shall have individual cleanout openings between sections covered with insulated steel covers designed to ensure a gas tight seal. Boiler shall have individual cleanout openings between sections covered with insulated steel covers designed to ensure a gas tight seal.

8. Boiler flue canopy shall be constructed of aluminized steel and shall be concealed under the insulated metal jacket. Flue connector(s) shall be Top vertical outlet, securely fastened and sealed to the canopy

and shall utilize a fixed baffle in the flue collar and shall be equipped with a pressure test tapping. Boiler manufacturers with horizontal flue outlets shall be required to furnish induced draft fans if boiler capacity cannot be met with chimney/vent system as scheduled.

9. The 20 Gauge steel Boiler jacket shall be provided with foil backed, 1" inch thick fiber glass insulation and have a rust resistant baked enamel finish. Jacket shall have removable side panels on the left side so that the jacket can be removed for cleaning without removing screws or disturbing system piping.

10. Boiler trim shall include:

    a. Combination Pressure-temperature gauge.

    b. Honeywell L404C high limit aquastat equipped with manual reset and SPDT switch for alarm and alarm terminal.

    c. Operating aquastat and Low Fire control.

    d. ASME approved water relief valve sized to exceed the Gross Output of the Boiler that shall be factory set to relieve pressure at 15 PSI.

    e. One (1) M&M #PS-851-M-120 Low Water cutoff device with manual reset. Probe LWCO shall incorporate a Burner circuit test switch that, when depressed, will test out the burner control circuit by dropping out the Burner if the circuit is properly wired. Boiler shall be fitted with either a float type or a probe type LWCO located above the lowest safe permissible water level established by the Boiler manufacturer. LWCO shall be UL listed and FM approved, suitable for commercial hydronic heating service at 50 PSI. If a float type LWCO is installed, it shall be vented at a high point and equipped with a pair of McDonnell & Miller Test-N-Check Model TC-4 valves. Simple time delay shall not be considered acceptable to this installation.

    f. Honeywell L404A operating temperature control

    g. M&M 157 pump control low water cut-off

    h. L91B modulating control

D. Electrical Coordination: Coordinate with electrical contractor to provide the following:

1. All Boiler room wiring from the main disconnect switch panel to the Burner Control panels, Flame Safeguard Controls, Multiple Boiler Control System, Circulators, Limits, Operating controls, Gas Valves, switches and additional control devices shall be furnished and installed under this section of the work.

2. Motors shall meet the requirements of separate specification "Motors, Drives and Starters" paragraph, be a maximum of 2 HP. furnished for operation on 1 Phase/230 Volts/60 Hz. Control circuit shall be taken from a two-wire branch circuit, one side grounded, not exceeding 150 Volts, line to line. All safety control switching shall be accomplished in the hot ungrounded conductor and through the 24V low voltage wiring provided by the Boiler manufacturer and in accordance with the manufacturer's instructions and recommendations.

3. An electrical thermal switch fused to break the ungrounded conductor in the main circuit at 165° F. shall be installed in the main power line within six feet over the top of the burner. If the ceiling above the Burner exceeds 12 feet in height, an additional thermal switch shall be installed on the ceiling and series connected with the lower switch. Fuse protection for the control circuit shall be provided. A manually operated remote heating plant shutdown switch shall be furnished and installed just outside the Boiler room door and shall be marked for easy identification. If there is more than one (1) Boiler room door, there shall be a switch located at each door. Shutdown switches must be wired to disconnect all power to the Boiler controls.

4. Furnish and install a flow switch, Honeywell or equivalent, installed in the common supply water piping up-stream of the Multiple boiler Water Temperature Sensor. Flow switch shall be wired so as to prevent Burner operation during no-flow conditions across the supply water temperature sensors.

5. All wiring for the Boiler and Burner shall be rated for the Maximum operating temperature to which it may be exposed. All wiring between components shall have copper conductors not less than 18 AWG and constructed in accordance with the NEC/NFPA 70. All field installed romex, conduit, junction boxes and the like shall be installed so as not to interfere with the Boiler manufacturers recommended cleaning and maintenance procedures.

E. Boiler shall be furnished with a Natural Gas burner system listed by the Boiler Manufacturer, tested to I=B=R standards and capacities and which shall be listed by the Gas Regulatory Board. Burner shall incorporate all the necessary devices and controls to make a complete fuel burning system and shall bear Underwriters Laboratories seal of approval.

F. Combustion System – Power Flame

1. Each unit shall include a forced draft flame retention type burner having a ring of recessed gas ports with an orifice for each port, primary air adjustment and externally mounted gas pilot and a high pressure atomizing oil burner tested by Underwriters Laboratories and complying with the rules and regulations U.L., as well as the local authorities having jurisdiction. The burner shall be capable of firing a Series 4500A-S-1 boiler with #2 oil and natural gas against a furnace pressure of 0.02 inches of water column, with supply gas pressure of 4 inches w.c. at the inlet to the main manual shutoff cock. The Burner shall be Power Flame or equal.

2. The gas train shall be U.L. listed and shall consist of the following items: All Mass gas and oil codes are applicable.

   Main Motorized Gas Valves

   Ventless High and Low Gas Pressure Switches

   Auxiliary Solenoid Gas Valve

   Lubricated Shutoff Cock

   Ventless Maxitrol Gas Pressure Regulator

3. The burner shall be driven by a 2 HP 3450 RPM, 208 volts, 60 hertz, and three-phase alternating current motor. Control circuit voltage shall be supplied from this single point connection.

4. The burner shall be arranged for Modulation firing of both fuels. The burner shall provide for an open damper pre-purge through a damper motor.

5. The burner shall include the appropriate oil piping and pumping to supply the nozzle arrangement, dual automatic safety shutoff valves, return oil pressure control, air flow switch and combustion air damper control.

6. Oil pressure shall be obtained from a 300 PSI fuel unit driven by the burner motor. The fuel unit shall have two-stage pumping gears, self-contained pressure regulating valve and shall be suitable for 3450-RPM service with suction vacuum up to 15".

7. Burner shall be equipped with an electronic flame safeguard system and scanner. The control shall be a Honeywell RM7800L UV Flame System microprocessor-based, burner management control system with self-diagnostics and non-volatile memory.

8. Control Panel:

   The burner mounted control panel shall include the following:

   Indicator lights: Power-On, Main Fuel, Call for Heat, Ignition, Main Flame Failure (Alarm), Low Water (Alarm). Alarm Bell to sound on Main Flame Failure. Low Water Alarm Reset System shall be provided to silence the Bell but the light will remain lit until the fault has been corrected. A manual pot and switch shall be included to allow the burner to be adjusted to intermediate firing positions, as job conditions require.

9. 12,000 Volt Direct Spark Ignition Transformer for the oil side.

G. Provide the services of a Company Field Advisor of the Boiler manufacturer for the following:

1. To assist and review the installing contractor with the assembly and erection of the Boiler. Upon completion of the Boiler assembly, the Boiler manufacturer's Company Field Advisor shall certify the proper assembly and connection of the Boiler prior to startup.

2. The Boiler manufacturers Company Field Advisor shall be Present at time of Start-up to supervise the initial firing of the Boiler.

3. The Boiler manufacturer's Company Field Advisor shall instruct Boiler Room Operating Personnel.

H. After final assembly and connection, each Boiler shall be thoroughly cleaned internally following the manner described within the Boiler manufacturers installation instructions, or by ASME Section VI, either method acceptable by the Engineer.

I. The process of cleaning the Boiler(s) shall include the use of a boil-out compound of Caustic Soda or Tri-Sodium Phosphate at the rate of one (1) pound of either chemical per 50 Gallons of total water in the system being cleaned. This cleaning shall include Boiler Cleanout, Surface Blowoff, Blowdown and a wash as directed and detailed in referenced instructions. The process of cleaning the Boiler(s) shall be repeated as often as necessary and as directed by the Consulting Engineer to ensure that all mill scale, core sand, rust, dirt and debris, cutting oils and thread sealers or any other contaminants have sufficiently been eliminated from the Boiler and to produce a condition of the Boiler water that is clean and considered acceptable to the Consulting Engineer.

J. All field tests after the Boilers have been installed and connected to the system shall be limited to not more than 50 PSI. Installing Contractor shall furnish all equipment, piping, labor, staging, fittings, valves, hoses and other materials and shall pay all required permits for Inspection as may be required to perform such tests as may be directed by these Contract Documents and as required by the Consulting Engineer and the State Boiler Inspector.

1. An initial hydrostatic pressure test of 50 PSI shall be conducted on each Boiler for a period of not less than 5 hours. Tests shall be of such duration as necessary and as directed by the Consulting Engineer to ensure that each Boiler has been installed and piped correctly with no leaks or other improper operating conditions.

2. Installing Contractor shall contact and notify the State Boiler Inspector when the installation of the Boilers, Burners and controls is substantially complete. Installing Contractor shall request an inspection of the Boilers to be conducted by the State Boiler Inspector and to have a Certificate of Inspection issued upon satisfactory inspection.

3. After receipt of certificate of Inspection, Installing Contractor shall furnish a suitable glass front frame in which to place said certificate. Frame, with Inspection certificate inserted therein, shall then be placed on or posted in a suitable location within the Boiler room in which the new Boilers have been installed.

4. Installing Contractor shall maintain all apparatus in satisfactory operating condition. Perform periodic Burner tune-up and cleaning of the Boiler fireside surfaces when dirty, provide preventative maintenance, perform turndown tests, conduct tests for Flame Safeguard, Combustion Efficiency, Draft tests, Limit Control tests and Safety Valve tests, check the ignition system and adjust, repair or replace any as necessary while the heating system is under his ownership and control a and until such time as the Owner accepts the equipment, issues the Final certificate of Payment and assumes the full obligation of Ownership.

5. Installing Contractor shall note that any follow-up Burner Service (Hereinafter specified) as may be absorbed by the authorized Service representative shall in no way absolve the Installing Contractor from any and all responsibility for the Care, Service and Preventative Maintenance for Materials furnished to this Contract, while the Heating System is under his Control, and until final acceptance by the Owner.

K. Acceptance Testing:

1. An authorized representative of the Boiler or Burner manufacturer shall perform the initial start-up, final adjusting and testing of the Burners and Controls in the presence of the Gas Inspector and the gas Company representative and the Owners Operating Personnel.

2. The process of Start-Up and Acceptance Testing shall include Purging of the Boilers; Burner Operation Tests, including CO sampling, Stack Temperature; CO_2 sampling; Tests for Venting; Ignition Tests; Pilot Turndown Tests; Manifold Pressure Tests, Instruction to the Owner and all other such procedures as may be directed by the Consulting Engineer.

3. The final results of a Combustion Efficiency Test with all pertinent Combustion Data shall be logged onto a check sheet which shall be submitted to the Consulting Engineer to prove compliance with this section of the Specifications and for Record purposes.

4. Combustion efficiency testing shall include no less than the following:

a. Clock and adjust Burner input at the Meter to establish correct rate of fire and set each Burner to rated input at High Fire. Set Main Gas regulator and provide all adjustments to both Primary and Secondary Air as necessary to ensure proper flame shape at 100% input with no direct impingement upon heating surfaces and with good quality through the High to Low rates of input with not more than 0.04% CO in the flue gas analysis.

b. CO_2 in the flue gas at Low and High rates of fire with recorded Gross and Net Stack Temperatures to establish stack loss value. Burner shall be set to operate at the overall best performance and combustion efficiency for which the equipment is designed and capable of.

c. Adjustment and checkout of all aquastat controls, limits, switches, operating controls, low water cutoff devices, gas valves, pressure regulators, combustion controls, high and low gas pressure switches and all Lockout conditions.

d. He shall supervise purging of the Boiler and shall conduct Pilot turndown tests. All required tests for proper venting which shall include setting and adjusting the Boiler outlet damper to the Boiler manufacturer's specifications.

e. Provide instruction to the Owners Operating Personnel in the procedures to resolve a "Lockout" condition. Operating personnel shall also be instructed in the Operation and routine daily maintenance of the Burner and controls during the lightoff process. The Owner shall arrange to have the personnel who require training to be present at the Lightoff.

L. Factory Authorized Service representative shall provide the initial Burner lightoff and One (1) Year of Follow-Up Burner service. This requirement shall not be waived, nor shall the responsibility for the Service Contract be assumed by any other party unless previously approved by the Consulting Engineer in writing.

M. Authorized manufacturers service representative shall furnish One (1) Year of Follow-Up Burner Service on the Burner and Controls which shall commence from the Date of Original Lightoff and shall continue to provide Follow-Up Burner Service coverage up to and including the First Anniversary of Burner Lightoff.

N. Follow-Up Burner service shall include labor and materials to replace any parts or controls which might fail in service as the result of a defect in materials or manufacture. Normal wear and tear on parts as the result of daily operation will not be included as "no charge" items (nozzles, igniters, etc.) and other such devices, which may require replacement as the result of operation during the Service Contract shall not be included as "defective".

O. Preventative maintenance, in the form of yearly tune-up and bi-yearly cleanings and adjustments shall be the responsibility of the Installing Contractor throughout the duration of his Guarantee Contract while the equipment is under the Acceptance criteria of these Contract Documents and by the Owners obligated Service Company after Final Acceptance.

2.10 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:

8. 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.

9. Maximum distances between braces in the longitudinal direction shall be 80 feet.

10. Tops of risers shall be provided with 4-way braces.

11. Flexible couplings shall be provided within 12” of floor and wall non-breakable penetrations and within 24” of all building expansion joints.

12. Hangers closest to the sway bracing shall be installed with an extended rod to the piping to resist upward movement of the piping.

13. Lateral sway bracing shall not be required on piping supported with rods less than 6” long.

14. 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.

15. C clamps for attachment to the building structure must be provided with retaining straps.

16. 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. Fan Coil Units, Exhaust Fans, Supply Fans, Return Fans, Transfer Fans, Unit Heaters, 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 five (5) 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.

D. Pump Flexible Connectors

1. Double sphere neoprene connector with floating ASA drilling flanges (Class type to match adjacent pump and piping flanges.): Mason Model SFDEJ. (Flexible connectors to be installed where shown on drawings.)

E. All vibration isolators shall be selected in accordance with the weight distribution of the equipment to be served so as to produce a uniform deflection. Deflections shall be as hereinbefore specified.

F. Submittals shall include all spring deflections, spring diameters, scale drawings, attachment details, and rated capacity indicating adequacy for each piece of equipment served.

2.11 UNIT HEATERS (STEAM)

Heaters shall be as specified below, and shall have a heating capacity not in excess of 125 percent of the capacity indicated. [Noise level of each unit heater for areas noted shall not exceed the criteria indicated.]

A. Propeller Fan Heaters

Heaters shall be designed for suspension and arranged for horizontal discharge of air as Indicated. Casings shall be not less than 20 gauge black steel and finished with lacquer or enamel. Suitable stationary deflectors shall be provided to assure proper air and heat penetration capacity at floor level based on established design temperature. Suspension from heating pipes will not be permitted. Horizontal discharge type unit heaters shall have discharge or face velocities not in excess of the following:

Unit Capacity, cfm	Face Velocity, fpm
Up to 1,000	800
1,001 to 3,000	900
3,001 and over	1,000]

2.12 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 (other than pre-insulated underground piping), 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).

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 chilled water, hot water, dual temperature water, make-up and feed water, blow-down, all outdoor condenser water piping, condensate drain, glycol heat recovery (with down to 0°F minimum winter temperature), boiler feed water, heated oil, water defrost piping in refrigerated rooms, 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 chilled water, dual temperature water and glycol heat recovery systems).

2. Equipment and Flue Gas Breeching Insulation - General:

a. 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.

b. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retardant cement.

c. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.

d. 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).

e. For equipment located outdoors, in mechanical equipment rooms (all within 7 feet of floor), 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.

f. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.

g. 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.

3. Equipment and Flue Gas Breeching Insulation: Provide the following insulation types for the listed equipment.

a. Insulate hot water air separators, heat exchangers, duct coils, storage tanks (board insulation only) and pump casings; and low pressure steam converters 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.

b. Insulate high temperature hot water air separators, heat exchangers, and pump casings; and steam converters, flash and surge tanks between 250°F and 600°F with 4” thick rigid 3.0 lb/cu ft density fiber glass board. Insulation shall be equal to JM type 1000 Spin-Glas meeting ASTM C 612, Type II, noncombustible with K-factor of 0.23 at 75°F mean temperature.

c. Insulate higher temperature equipment and flue gas breeching between 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.

d. Insulate condensate drain pans that are not factory insulated; chilled/water and brine air separators, heat exchangers, expansion tanks, and pump casings; cold surfaces of chillers that are not factory insulated; refrigerant suction accumulators and other cold refrigeration equipment that are not factory insulated with flexible cellular elastomeric foam insulation. Insulation thickness shall be ¾ inch thick for equipment between 40°F and 60°F, 1.5 inch thick for equipment between 0°F and 40°F, and 2 inches thick for equipment between -40°F and 0°F. Insulation shall be equal to Armstrong Armaflex meeting ASTM C 534 Type II flexible, cellular elastomeric, roll or sheet with flame spread/smoke developed rating of no more than 25/50 (up to 1 inch thick) with K-factor of 0.30 at 75°F mean temperature. For insulation thicker than 1” provide multiple staggered layers. Provide waterproof vapor retardant adhesive. Outdoor equipment shall have a minimum 50% thicker insulation. Provide additional tapered insulation for outdoor equipment to insure no pooling of water on top of equipment. Provide 2 coats of UV protective coating for outdoor use.

4. Ductwork Insulation (External Wrap) - General

a. Where duct is internally lined (coordination locations with ductwork sub-contract or), exterior insulation is not required unless called for on the plans or where required by the following.

1) Wrap lined supply ductwork (with 1½” thick or more liner) carrying cool air (below 60°F) in concealed or unconditioned spaces, where sheet metal nosing or other lining erosion protection has bridged the thermal barrier (condensation may occur), with minimum ½” thick external insulation with a 3 inch overlap on both sides of the thermal bridge. Coordinate these locations with the sheet metal contractor.

2) Wrap lined supply and return ductwork (with only 1” thick liner) located in concealed shafts or plenums (except for areas where the return air is not ducted, such as return air plenums) or unconditioned spaces with minimum ½” thick external insulation (to meet energy code R5 requirement).

b. Where ducts are insulated or lined, flexible connectors to equipment shall be insulated. Duct flanges and standing seams shall be insulated the same as the duct.

c. 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.

d. Return and exhaust air ductwork in ceiling plenums shall not be insulated unless otherwise noted.

e. 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.

f. For exterior rectangular ductwork, insulation shall be a minimum of 2 inches thick and shall be covered with a self-adhering double layer (aluminum facing with high-density polyethylene base) waterproofing membrane, such as MFM Flex-Clad 400, Venture Tape Corp. VentureClad 1577CW, or equal. Provide tapered insulation for outdoor ductwork to insure no pooling of water on top of duct. Outdoor round ductwork shall be weatherproofed in the same manor as outdoor piping with a minimum of 2 inch thick insulation.

H. Minimum pipe insulation thickness shall be as shown in Table 1:

TABLE 1

MINIMUM INSULATION THICKNESS IN INCHES FOR INDOOR PIPE SIZES (See Notes 1 Through 4)

Piping System Types	Fluid Temperature Range (^oF)	Run Outs Up To 1"	<1"	1" And 1-1/4"	1-1/2" To 3"	4" To 6"	8" And Larger	K-factor Btu-inch/ ^oF-hr-sf) at ave. temp. (^oF)
Low Press. Steam/ Any Steam Cond./ Low Temp. Heat.	201- 250	1.0	1.5	1.5	2.0	2.0	2.0	0.27-0.30 @ 150°

Notes:

1. For minimum thickness of alternative insulation types outside the stated conductivity range, see Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulations, ASTM C 335-95, and the Mass. State Building Code, 780 CMR13, 1305.3.9.
2. Run outs to individual terminal units shall not exceed 4 feet in length.
3. For dual temperature systems (heating and cooling) use the thicker insulation value required for either heating or cooling and provide vapor barrier jacket.
4. For outdoor chilled water/glycol/brine piping, double thickness listed. For outdoor steam, heating water, and steam condensate piping, add 50% to thickness listed.

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.

2.13 METAL CHIMNEYS AND FLUES

A. Boilers:

1. Furnish and install, as shown on the drawings, a welded liquid tight 14 gauge black iron breeching system.

2.14 FANS

A. General

1. Fans shall be tested, rated and certified according to AMCA 210. Fans may be connected to the non-overloading motors either directly or indirectly with V-belt drive. Motor shown on the drawings as used with VFD's shall be VFD rated. V-belt drives shall be designed for not less than [150] [140] [120] percent of the connected driving capacity. Motor sheaves shall be variable pitch for 15 hp and below and fixed pitch as defined by ARI Guideline D. Variable pitch sheaves shall be selected to drive the fan at a speed which will produce the specified capacity when set at the approximate midpoint of the sheave adjustment. When fixed pitch sheaves are furnished, a replaceable sheave shall be provided when needed to achieve system air balance. Motors for V-belt drives shall be provided with adjustable rails or bases. Removable metal guards shall be provided for all exposed V-belt drives, and speed-test openings shall be provided at the center of all rotating shafts. Fans shall be provided with personnel screens or guards on both suction and supply ends, except that the screens need not be provided, unless

otherwise indicated, where ducts are connected to the fan. Fan and motor assemblies shall be provided with vibration-isolation supports or mountings as indicated. Vibration-isolation units shall be standard products with published loading ratings. Each fan shall be selected to produce the capacity required at the fan static pressure indicated. Sound power level shall be as indicated. The sound power level values shall be obtained according to AMCA 300. Standard AMCA arrangement, rotation, and discharge shall be as indicated.

2. Provide each fan with motors and accessories as shown on the drawings and specified elsewhere.

3. Fan manufacturer shall be as scheduled on the drawings, or provided they meet all requirements of these specifications, scheduled capacities and efficiencies, and fit with proper accessibility. Acceptable manufacturers shall be Greenheck, Twin City, Cook, Buffalo, Trane, Chicago, Hartzell, Kanalflakt, New York Blower, Pace or Penn.

B. Panel Type Power Wall Ventilators

1. Fans shall be propeller type, assembled on a reinforced metal panel with venturi opening spun into panel. Fans with wheels less than 24 inches diameter shall be direct or V-belt driven and fans with wheels 24 inches diameter and larger shall be V-belt drive type. Fans shall be furnished with wall mounting collar. Lubricated bearings shall be provided. Fans shall be fitted with wheel and motor side metal or wire guards which have a corrosion-resistant finish. Provide spring loaded backdraft dampers.

2.15 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, 1995)	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 HVAC system including ductwork and equipment, 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 Velocity Classifications:

Pressure Class	Static Pressure Rating (1)(2)	SMACNA Seal Class(3)	SMACNA Leakage Class(3)	Velocity Limits
10”	10” Pos. or Neg.	A	6	2000 fpm or greater
6”	6” Pos. or Neg.	A	6	2000 fpm or greater
4”	4” Pos. or Neg.	A	6	4000 fpm or less
3”	3” Pos. or Neg.	A	6	4000 fpm or less
2”	2” Pos. or Neg.	B	12	2500 fpm or less
1”	1” Pos. or Neg.	B	12	2500 fpm or less
(1) For negative pressure over 3” w.g., refer to SMACNA Round and Rectangular Industrial Duct Construction Standards for joint and intermediate reinforcement requirements.				
(2) For round ductwork, negative pressures over 2” w.g., refer to SMACNA round industrial duct construction standards and build to negative rating specified (-4” w.g. min.).				
(3) Leakage Class and the associated Seal Class for ductwork serving laboratories, hospital operating rooms, and clean rooms shall allow ½ the leakage listed: i.e., 2” pressure class would have Leakage Class 6 with Seal Class A (not Class 12 with B Seal).				

D. Duct Construction

1. Unless otherwise specified or shown on the drawings, use the following pressure classifications for the types of ductwork listed below:

4” (POS) Class:	All supply ductwork between the discharge of air supply units to the inlets of supply terminal volume boxes.
4” (NEG and POS):	All suction and discharge fume hood, kitchen exhaust hoods, smoke exhaust ductwork and for medium pressure return systems, all ductwork between air supply units to outlets of return terminal volume boxes.
2” Class:	All other ductwork.

2. Ducts required to be continuously welded, such as kitchen exhaust (hoods and dishwasher) and with all penetrations sealed (damper rods, access doors, etc.) shall be liquid-tight and shall be airtight. The leakage test shall yield a zero leak rate. All welding shall use inert gas shielding with filler rod equal to or exceeding the base metal properties.

3. Non-welded duct seals and joints shall be as listed by SMACNA or Ductmate for the specified pressure and seal classes.

4. 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.

5. 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

c. For round ductwork provide stamped elbows, with centerline radius equal to 1-1/2 times duct diameter, or sealed, gored elbows as follows:

Elbow Angle	No. of Gores
0 – 36	2
37 – 72	3
73 – 90	5

d. Elbows for flat oval ducts shall have centerline radius equal to 1-1/2 times duct diameter in plane of bend, or sealed, gored elbows with gores as specified above for round ducts.

6. Transitions: Diverging air flow transitions shall be made with each side pitched out a maximum of 15 degrees, for an included angle of 30 degrees. Transitions for converging air flow shall be made with each side pitched in a maximum of 30 degrees, for an included angle of 60 degrees, or shall be as indicated. Factory-fabricated reducing fittings for systems using round duct sections when formed to the shape of the ASME short flow nozzle, need not comply with the maximum angles specified.

7. 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 round/oval ducts, the flexible material shall be secured by stainless steel or zinc-coated, iron clinch-type draw bands. 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 UL 214 and be classified as "flame-retarded fabrics" in UL-01.

E. Ductwork Accessories

1. Access Doors shall be rated for the duct pressure class they are installed in. For hazardous exhaust sytems, 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. Fire Dampers

5. Backdraft Dampers

a. Back draft dampers shall be provided where indicated and required, and shall consist of a set of externally adjustable counter weighted louvers that open automatically due to excess pressure and prevent reverse flow. The edges of the blades shall be provided with seals to prevent rattling and minimize air leakage. The damper blades shall be supported on metal frames designed for wall mounting as indicated. The dampers shall be rated for operation up

to a minimum of 2,500 fpm and be standard catalog products of Ruskin, Vent Products, American Warming and Ventilating or approved equal.

6. Motor Operated Dampers and Actuators

a. Motor operated 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.

2.16 BOILER FEED 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 boiler feed pumping unit shall be the triplex type as indicated. The unit shall consist of:

1. Stainless steel condensate receiver

2. Three (3) boiler feed pumps with electric motor drive

3. Three (3) 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, 3500 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 1 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, 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. 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.

2.17 AIR COMPRESSOR

A. Air compressor shall be a Quincy Model QCS 5 as scheduled or approved equal.

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. 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 shut down 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. 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.

H. 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.

3.01 GENERAL

A. Install all items specified under PART 2 - PRODUCTS, according to the manufacturer's requirements, shop drawings, the details as shown on the Drawings and as specified in this 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 B31.1 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 Architect'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 and valves provided or installed under this Section of the Specifications and shall be marked for ease of identification.

2. Marking shall be done using self-adhering labels applied to clean, smooth surfaces or attached by use of pop rivets (sealed), cable ties or chains. All lettering shall be embossed or 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

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:

5.

SCHEDULE OF PIPING IDENTIFICATION		
Service	**Legend**	**Background Color**
Condensate drains	Condensate Water	Green
Low pressure steam	LPS	Yellow
Low pressure steam condensate	LPC	Yellow
Pumped steam condensate	PC	Yellow
Steam Relief	STM/RLF	Yellow
Make up water	MUW	Green

6. 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.

7. All markers shall be OSHA approved.

C. Equipment Identification

1. Equipment marking shall be prominently located on the normally visible side of the equipment.

2. Equipment identification designations shall be taken from equipment schedules as indicated on the Drawings.

   a. 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.

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 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. Provide a Valve List for all valves keyed to 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 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. Tags shall be circular black and white laminated fibre-engraved white showing through tags of at least 1½" 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 shall be 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.

E. Control Panel and Field Device Identification

1. This contractor shall furnish and install bar coded tags for all control panels and control field devices (coordinate with controls contractor for info) using a 4-inch by 2½-inch bar coded label/tag. For outdoor panels, provide two labels for each panel, one located on the exterior and one located inside the panel. Each label/tag shall have its appropriate bar code (Code 39 Standard) directly below the panel or field device name. Label shall include panel or device manufacturer, model number, serial number, and manufacturer's web site. See Paragraph G for additional requirements.

3.03 PIPING - GENERAL

A. 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. 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, except that bending of pipe 4 inches and smaller will be permitted provided a pipe bender is used and wide sweep bends are formed. The centerline radius of bends shall not be less than 6 diameters of the pipe. Bent pipe showing kinks, wrinkles, flattening, or other malformations will not be accepted. Carbon steel piping to be bent shall conform to ASTM A 53, Grade A, standard, or Grade B extra-heavy weight. Vent pipes shall be carried through the roof and shall be properly flashed. Unless otherwise indicated, horizontal supply mains shall pitch down in the direction of flow with a grade of not less than 1 inch in 40 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. Unless otherwise specified or shown, connections to equipment shall be made with malleable-iron unions for steel pipe 2-1/2 inches or less in diameter and with flanges for pipe 3 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 couplings or other approved methods. Reducing fittings shall be used for changes in pipe sizes. In horizontal HTW lines, reducing fittings shall be eccentric type to maintain the top of the lines at the same level.

B. Pipe Sleeves

Pipe 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, 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 nonfire 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 0.0l6 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. When penetrating roofs, before fitting the metal jacket into place, a 1/2-inch wide strip of

sealant shall be run vertically along the inside of the longitudinal joint of the metal jacket from a point below the backup material to a minimum height of 36 inches above the roof.

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.

C. Pipe Joints

Joints between sections of pipe and fittings shall be welded or flanged on all HTW piping. On auxiliary piping, except as otherwise specified, fittings 1 inch and smaller shall be threaded; fittings 1-1/4 inches up to, but not including, 2-1/2 inches may be either threaded or welded; and fittings 2-1/2 inches and larger shall be either flanged or welded. Pipe and fittings 1-1/4 inches and larger installed in inaccessible conduits or trenches beneath concrete floor slabs shall be welded. Connections to equipment shall be made with black malleable-iron unions for pipe 2 inches or smaller in diameter, and with flanges for pipe 2-1/2 inches or larger in diameter.

1. Threaded Joints

Threaded joints shall be made with tapered threads properly cut and shall be made perfectly tight with a stiff mixture of graphite and oil, or polytetrafluoroethylene tape or equal, applied to the male threads only, and in no case to the fittings.

2. Welded Joints

Welded joints shall be fusion welded in accordance with ASME B31.1, unless otherwise required. 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 approximately 100 degrees F 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 32 degrees F.

d. Defective Welding: Defective welds shall be removed and replaced. Repairing of defective welds shall be in accordance with ASME 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. Electrodes that have been wetted or that have lost any of their coating shall not be used.

3. Flanged Joints or Unions

Flanged joints or unions 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 similar items. Flanged joints shall be faced true, provided with gaskets, and made square and tight. Full-faced gaskets shall be used with cast iron flanges.

4. Flared and Sweated Pipe and Tubing

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. Installation shall be made in accordance with the manufacturer's recommendations. Changes in direction of piping shall be made with flared or soldered 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 flared fittings shall be of the compression pattern. 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.

5. Mechanical Tee Joint

An extracted mechanical tee joint may be made in copper tube. Joint shall be produced with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, dimpled depth stops shall be provided. The branch tube shall be notched for proper penetration into fitting to assure a free flow joint. Joints shall be brazed in accordance with NAPHCC-01. Soldered joints will not be permitted.

6. Steam Systems

Piping may have threaded, welded, or flanged joints as applicable and as specified. Reducing fittings shall be used for changes in pipe sizes. In horizontal steam lines, reducing fittings shall be the eccentric type to maintain the bottom of the lines at the same level. Grooved mechanical joints shall not be used.

7. Flanges and Unions

Flanges and unions shall be faced true, and made square and tight. Gaskets shall be nonasbestos 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.

3.04 FIRESTOPPING INSTALLATION

Install firestopping assembly at locations shown and as specified in accordance with UL FRD systems or FM P7825 designs, and as recommended by manufacturer. Do not cover or enclose firestopped areas until approved by the Owner's Representative.

A. Firestopping Locations

Completely fill openings around penetrating items with firestopping material to prevent spread of fire in the following locations:

1. Around duct, cable, conduit, piping, and their supports that penetrate fire-rated above grade floor slabs, interior partitions, and exterior walls.

2. Around openings and penetrations through fire-rated ceiling assemblies.

3. Around penetration of vertical fire-rated service shafts.

4. Around openings and penetrations through fire-rated enclosures.

5. Other locations indicated.

6. At all air barrier penetrations as defined in Massachusetts Energy Code 780 CMR13.

B. Filling of Voids

Completely fill voids flush with the surface; the depth of material shall be in accordance with UL FRD or FM P7825. Firestopping for filling voids in floors in which smallest dimension of a void is 4 inches or more shall support the floor design load or be protected by a permanent barrier. Damaged, disrupted, or removed firestoppings shall be replaced with new firestoppings as specified in this section.

C. Insulated Pipes and Ducts

Cut and remove thermal insulation where pipes or ducts pass through firestoppings. Replace thermal insulation with a material having equal thermal insulating characteristics and equal firestopping characteristics.

D. Wall and Floor Penetration by Plastic Drain, Waste, and Vent Pipes

A 2 hour fire resistive chase enclosure is maintained by encasing the pipe in an 18 inch steel sleeve and penetrating the chase at a 45 degree downward angle. Chases shall be firestopped at each floor.

3.05 SUPPORTS

A. General

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. Seismic Requirements for Pipe Supports and Structural Bracing

1. Structural Attachments

Structural steel brackets required to support piping, headers, and equipment, but not shown, shall be provided under this 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

In the support of multiple pipe runs on a common base member, a clip or clamp shall be used 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

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, which ever 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. Piping in Trenches

Piping shall be supported as indicated.

E. Escutcheons

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 automatic control valve, pump and elsewhere as shown on the Drawings. 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.

C. 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. At inlet and outlet of each chilled and hot water heating coil (except fan coils and UHs).

c. At inlet and outlet of each heat exchanger.

d. In addition to the above, as indicated on diagrams.

2. All gages shall be provided with "T" handle gage cocks. 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 and Wells

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.

3. Thermometer wells shall be installed at:

a. Inlet and outlet of each unit heater, cabinet unit heater fan coil units, and unit ventilators.

4. Thermometers (and wells) shall be permanently installed at:

a. Water inlet and outlet of each chilled and hot water heating coil.

b. Elsewhere as indicated in Piping Details on Drawings.

3.08 VALVES AND EQUIPMENT ACCESSORIES

A. Valves and Equipment

Valves shall be installed at the locations shown or specified, and where required for the proper functioning of the system as directed. Gate valves shall be used unless otherwise indicated, specified, or 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 sweat-type connections for copper tubing.

B. Gravity Flow-Control Valve

The valve to control the flow of water shall be installed in the supply main near the heat exchanger. The valve shall operate 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. Thermometer Socket

A thermometer well shall be provided in each return line for each circuit in multicircuit systems.

D. Air Vents

Vents shall be installed where indicated, and on all high points and piping offsets where air can collect or pocket.

1. Water Air Vents

[High] [Medium] temperature water air vents shall be as indicated. Vent discharge lines shall be double-valved with globe valves and shall discharge into a funnel drain.

2. Steam Air Vents

Steam air vents shall be a quick-acting valve that continuously removes air. Valve shall be constructed of corrosion-resisting metal, shall \&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 on the shell of each steam heat exchanger.

3.09 STEAM TRAPS

Float Traps shall be installed in the condensate line as indicated. Other steam traps shall be installed where indicated.

3.10 UNIT HEATERS

Unit heaters shall be installed as indicated and in accordance with the manufacturer's instructions.

3.11 PIPING TESTS, CLEANING AND FLUSHING

A. Supply all materials, labor and power required for testing. He shall make preliminary tests and prove work satisfactory. Repair defects disclosed by tests or, if required by the Architect, replace defective work with new work without additional cost to the Owner. Pipe insulation shall be installed only after satisfactory completion of the pressure test.

B. Water Piping Tests

1. All water piping shall be hydrostatically tested at 150 psig at the highest point. Tests shall be for a four hour duration, during which time piping shall show no leaks and during which time no sealing of leaks will be permitted. Any equipment not capable of withstanding test pressures shall be suitably isolated from the test pressure.

2. Necessary chemicals shall be introduced with the water during pressure test to prevent any corrosion potential as a result of raw water contact with the internal pipe surface. Coordinate with the Water Treatment Sub-subcontractor for the proper chemicals to be used.

C. Water 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 and circulate water throughout system for period of three 8 hour days. At the end of each day of circulation, remove and clean all strainer baskets and blow off all low points.

3.12 BASES AND SUPPORTS

A. In addition to supports and hangers as mentioned in SECTION 05120 MISCELLANEOUS METALS, provide all bases and supports not part of the building structure, of required size, type, and strength, as approved by the Architect, 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.

3.13 WATERPROOFING

A. Pipes passing through slabs shall have the sleeve extended ¼" above floors of finished spaces and 2" above floors of mechanical equipment rooms. Except as specified below, the space between the pipe and sleeve shall

be caulked with lead wool. The top shall be sealed with lead and the bottom shall be sealed with monolastic caulking compound.

B. Ducts through slabs shall have the sleeve extended ¼" above floors of finished spaces and 2" above floors of mechanical equipment rooms. Except as specified below, the space between the pipe and sleeve shall be caulked with lead wool. The top shall be sealed with lead and the bottom shall be sealed with monolastic caulking compound.

3.14 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.

3.15 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.

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.

3.16 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. Piping

Pipes shall be cleaned free of scale and thoroughly flushed of all foreign matter. A temporary bypass shall be provided for all water coils to prevent flushing water from passing through coils. 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

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. Control valves and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.17 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, through the Architect, 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 Architect.

3.18 TRAINING

A. Conduct a training course for the maintenance and operating staff. The training period of 8 hours normal working time 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 video taped 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.

END OF SECTION

DIVISION 16

SECTION 16000

ELECTRICAL

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DIVISION 16
SECTION 16000
ELECTRICAL

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. 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 Wire ways
7. Motor Starters
8. Safety Disconnect Switches
9. Circuit Breakers for Installation in Existing Panelboards
10. Panelboards
11. Fuses
12. Supervision and Approval
13. Fire Seal and Fireproof Sealant
14. Electrical Connections to HVAC Equipment, and other Equipment provided under other Sections or by Owner.
15. Relocation of existing electrical components that interfere with new construction, and removal and disposal of obsolete components.
16. Testing
17. Shop drawings
18. Record (as-built) Drawings

B. Work of this Section is generally shown on the Electrical 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. 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 floor except as specified.

3. Temporary light, power, water, heat, gas and sanitary facilities for use during construction and testing. Refer to Division 1, General Conditions.

4. Painting, except as specified herein.

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 and set in place under other sections of the general contract and connected to the systems covered 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.

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. All Applicable NFPA Standards

2. Massachusetts Electrical Code (MEC)

3. Occupational Safety and Health Administration (OSHA)

4. State and Local Building Codes

5. Underwriters' Laboratories, Inc (UL)

6. 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:

7. American National Standards Institute (ANSI)

8. American Society of Mechanical Engineers (ASME).

9. American Society of Testing and Materials (ASTM)

10. Certified Ballast Manufacturers (CME)

11. Illuminating Engineering Society (IES)

12. Institute of Electrical and Electronics Engineers (IEEE)

13. Insulated Cable Engineers Association (ICEA)

14. National Electrical Contractors Association (NECA)

15. National Electric Manufacturers Association (NEMA)

16. Thermal Insulation Manufacturers Association (TIMA)

B. 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: 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: 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. 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.

1.07 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 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.

   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.

   c. Products must adhere to all architectural considerations including, but not limited to being 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.

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 a complete description of all controls and instrumentation required including electrical power connection drawing for all components an interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces with a central control system.

D. 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. Motor Starters
8. Lamps and Lighting Fixtures
9. Safety Disconnect Switches
10. Circuit Breakers
11. Panelboards
12. Fuses
13. Fire Seal and Fireproof Sealant

E. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This subcontractor 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.

F. 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.

G. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.08 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 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.

E. 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.

F. The Electrical Contractor shall submit the record set for approval by the engineer a minimum of two weeks prior to seeking the permanent certificate of occupancy.

1.09 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.

1.10 COORDINATION

A. Refer to Division 1, 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.

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. Plumbing, HVAC, Electrical and any other systems shall be shown and coordinated on these transparencies in the order listed by the respective contractors.

H. This Contractor shall, with the approval of the Owner's Representative and without extra charge, make reasonable modifications in his work as required by normal structural interferences, or by interference with work of other trades, or for proper execution of the work.

1.11 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. 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.

1.12 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.

1.13 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.

1.14 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.

1.15 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.

1.16 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.

1.17 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.

1.18 SCHEDULE

A. Construct work in sequence under provisions of Division 1 and as coordinated with the Owner's Representative.

1.19 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 scaffolds, staging and planking as required for the work.

1.20 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. See that all sleeves 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 band 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.

1.21 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. Unless otherwise specified herein, all pipes passing through walls or partitions shall be provided with sleeves and rating shall be maintained by installation of fire stopping.

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 can not 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.

1.22 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.

1.23 HAZARDOUS MATERIALS

A. Where it has been identified that asbestos-containing material exists within the scope limits, refer to the Asbestos Abatement specification section for requirements.

1.24 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.

PART 2 - PRODUCTS

2.00 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 with galvanized steel or brass screws. Adhesives or cements shall not be used.

2.01 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, double set screw from 2" and up that shall form a positive ground path.

C. Miscellaneous Conduit Fittings

1. Elbows shall be standard 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.

D. Flexible Metallic Conduit

1. Liquidtight Metal Conduit shall be UL listed fabricated from a spiral would strip of heavy gauge, corrosion resistant, hot dipped galvanized steel. The jacket shall be flame retarded, sunlight resistant PVC extruded over the spiral wrap. Sizes through 1¼" shall have an integral copper bonding strip. Liquidtight Metal Conduit shall be by Electri-Flex Company (Type LA), AFC Cable Systems, Thomas & Betts or approved equal.

2. Liquid tight 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. Flexible Metals Conduit shall be by Electri-flex Company (Type BR), AFC Cable Systems, Thomas & Betts or approved equal.

E. Wire ways 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 wire way as identified on the drawings for NEMA 1, 3R or 12 service. Wire ways shall be UL Listed.

2.02 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 #8 and larger shall be stranded; #10 and smaller shall be solid. Wire and cable shall have THWN-THHN insulation for branch circuit conductors, (#10 and smaller), and XHHW insulation for feeder conductors, (#8 and larger).

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.

E. 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: Burndy (YS-L HYLINK), ILSCO, Thomas & Betts or approved equal.

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: Burndy (TP-LF VINYLUG), ILSCO, Thomas & Betts or approved equal.

F. Wire management shall be provided by self-extinguishing self-locking nylon ties with -65 to 350o F. range for bundling conductors.

G. 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.

2.03 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 Brown for standard applications. Refer to the drawings for color requirements that vary from Brown. Equal products by 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. 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. General Use – Brown No. 5362CB

2.04 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 for interior surface mounted locations where RGS is specified where exposed to moisture, adjacent to water or steam connections, and where indicated as weatherproof on Drawings shall be cast malleable iron with an aluminum polymer enamel coating. Conduit entries shall be threaded cast hubs. Device covers shall be coated malleable iron with moisture sealing gasket and stainless steel fasteners. Boxes shall be by Appleton (Type FS), Steel City, Raco, or approved equal.

C. All boxes shall have at least one tapped and threaded grounding hole for connection of a 10-32 grounding screw.

D. Box depth shall accommodate code-required volume for the specified installation. Through wall boxes shall not be used.

2.05 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 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.

2.06 SAFETY DISCONNECT SWITCHES

A. Switches shall be three-pole heavy-duty type rated for 600V in NEMA 1 (interior dry applications) enclosures unless noted otherwise on the drawings. All switches shall be horsepower rated and suitable for service entrance use.

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 60o/75o 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. Safety disconnect switches shall be as manufactured by Cutler-Hammer, Square D, General Electric or approved equal.

D. 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. Manual motor starters shall be by Cutler-Hammer (as listed), Square D, General Electric, or approved equal.

2.07 FIRESTOPPING

A. 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.

B. Fire Hazard Classification

C. 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.

D. Firestopping Rating

1. Firestopping materials shall be UL FRD listed or FM P7825 approved for “F” and “T” ratings at lease 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.

PART 3 - EXECUTION

3.00 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 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 drawings illustrate the full extent of the scope of demolition. Disconnect and make safe all electrical equipment identified for removal on the Electrical, HVAC, and Plumbing 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.

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.

3.01 IDENTIFICATION

A. Nameplates

1. Provide nameplates on all equipment listed in other sections of this specification including but not limited to panelboards, junction and pull boxes, disconnect switches, motor starters and contractors.

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.

3.02 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 MEC 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.

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 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.

B. Rigid Galvanized Steel (RGS) Conduit

1. RGS may be used for all raceway applications outlined for EMT. 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.

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 can not be rotated.

C. Electrical Metallic Tubing (EMT)

1. EMT may be used for lighting and receptacle branch circuits, 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 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.

D. 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.

E. Wire ways 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. Wire ways shall be provided complete with all required appurtenances necessary to have a totally enclosed system rated for the environment. Wire ways shall not be installed in any location where subject to accidental damage or abuse.

3.03 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 MEC 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 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 2%.

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**
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

a. 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 will not be 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 cable (Type-MC) shall not be used.

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.

3.04 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.

3.05 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, such as below 8'0" AFF.

3.06 JUNCTION AND PULL BOXES

A. Junction box covers shall be accessible.

B. No pull box shall be within 2 feet of another.

C. 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.

3.07 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, 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.

3.08 FIRESTOPPING INSTALLATION

A. Install firestopping assembly at locations shown and as specified in accordance with UL FRD systems or FM P7825 designs, and as recommended by manufacturer. Do not cover or enclose firestopped areas until approved by the Owner's Representative.

B. Firestopping Locations: completely fill openings around penetrating items with firestopping material to prevent spread of fire in the following locations:

1. Around cable, conduit and their supports that penetrate fire-rated above grade floor slabs, interior partitions, and exterior walls.

2. Around openings and penetrations through fire-rated ceiling assemblies.

3. Around penetration of vertical fire-rated service shafts.

4. Around openings and penetrations through fire-rated enclosures.

5. Other locations indicated.

C. Filling of Voids: completely fill voids flush with the surface; the depth of material shall be in accordance with UL FRD or FM P7825. Firestopping for filling voids in floors in which smallest dimension of a void is 4 inches or more shall support the floor design load or be protected by a permanent barrier. Damaged, disrupted, or removed firestoppings shall be replaced with new firestoppings as specified in this Section.

3.09 GROUNDING

A. Provide equipment-grounding system as shown on Drawings. Equipment grounding system shall be designed so metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential, and provide low impedance path for possible ground fault currents.

B. System shall meet MEC requirements, modified as shown on Drawings and as specified.

C. Provide separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit. Install grounding conductor in common conduit with related phase or neutral conductors, or both.

D. Determine numbers and sizes of screw terminals for equipment grounding bars in panelboards and other electrical equipment. Provide screw terminals for active circuits, spares and spaces.

E. Provide green insulated grounding conductor in nonmetallic conduits or ducts unless specified otherwise.

3.10 TESTING, INSPECTION AND CLEANING

A. Test wiring and connections for continuity and grounds before equipment and/or fixtures are connected. Demonstrate insulation resistance by megger test as required. Insulation resistance between conductors and grounds for secondary distribution systems shall meet NETA requirements.

B. Verify and correct: voltages, tap settings, trip settings and phasing on equipment from secondary distribution system to points of use. Test secondary voltages at panelboards, and at other locations on distribution systems. Test secondary voltages under no-load and full-load conditions.

C. Test lighting fixtures with specified lamps in place for 100 hours. Replace lamps that fail within 90 days after acceptable by Owner within Contract Price.

D. Provide necessary testing equipment and testing.

E. Failure or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Replaced defective material.

F. Clean panels and other equipment. Panelboard interiors shall be cleaned and vacuumed. Equipment with damage to painted finish shall be repaired to Owner's satisfaction.

G. Equipment

1. After completion of project, clean the exterior surface of equipment included in this Section, including concrete residue.

END OF SECTION

9 Pages of Drawings

are available only on The City's Website: www.ci.newton.ma.us/bids