



Town of Fairfield

Sullivan Independence Hall
725 Old Post Road

Fairfield, Connecticut 06824
Purchasing Department

(203) 256-3060
FAX (203) 256-3080

BID #2018-68 BOILER REPLACEMENT HOLLAND HILL ELEMENTARY SCHOOL

TOWN OF FAIRFIELD
PURCHASING AUTHORITY
725 OLD POST ROAD
INDEPENDENCE HALL
FAIRFIELD, CT 06824.

Date Submitted _____ 2018.

SEALED BIDS are subject to the standard instructions set forth on the attached sheets. Any modifications must be specifically accepted by the Town of Fairfield, Purchasing Authority.

Bidder:

Doing Business As (Trade Name)

Address

Town, State, Zip

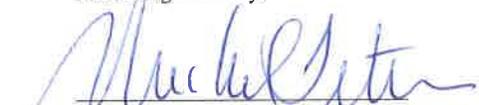
(Mr/Ms) Name and Title, Printed

Signature

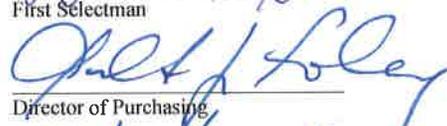
Telephone

Fax

E-mail



First Selectman



Director of Purchasing



Date

Sealed bids will be received by the Purchasing Authority at the office of the Director of Purchasing, First Floor, Independence Hall, 725 Old Post Road, Fairfield, Connecticut 06824, up to:

11:00AM, Tuesday, 15th May, 2018

To provide labor, materials, equipment and all else necessary, to perform demolition and proper disposal of existing boiler at Holland Hill Elementary School. Furnish and install one (1) new replacement boiler and all related components as detailed in the attached specifications.

NOTES:

1. Bidders are to complete all requested data in the upper right corner of this page and must return this page and the Proposal page with their bid.
2. No bid shall be accepted from, or contracts awarded to, any person/company/affiliate or entity under common control who is in arrears to the Town of Fairfield upon debt, or contract or who has been within the prior five (5) years, a defaulter as surety or otherwise upon obligations to the Town of Fairfield, and shall be determined by the Town.
3. Bid proposals are to be submitted in a sealed envelope and clearly marked "Bid #2018-68" on the outside of the envelope, including all outer packaging, such as, DHL, FedEx, UPS, etc.
4. Bid proposals are not to be submitted with plastic binders or covers, nor may the bid proposal contain any plastic inserts or pages.

INVITATION TO BID

The Town of Fairfield (Town) on behalf of its Board of Education (BOE) is seeking competitive bids from qualified contractors to provide labor, materials, tools, equipment, and all else necessary, to perform demolition, removal and proper disposal offsite of one (1) H.B. Smith boiler, model GOS28A-S-10 with dual fuel Power Flame burner, model C2-GO-20B1.

Furnish and install one (1) new Weil McLain, 88 Series 2, model BGL-1088SF (or Owner approved manufacturer) with dual fuel Riello burner, model RLS100.

Work shall include all equipment and components as defined in the contract documents prepared by Dumitru T. Petrescu, P.E., LLC., Mechanical & Electrical Consulting Engineers, 567 Rayzoe Terrace, Hamden, CT.

PRE-BID MEETING

A site meeting will commence inside the main lobby at Holland Hill Elementary School, 105 Meadowcroft Road, Fairfield at 3:15PM on Monday, 30th April, 2018 for prospective bidders to scope the conditions.

- While the meeting is non-mandatory, prospective bidders will be required to sign-in at commencement of the meeting. The sign-in sheet will be posted on the Purchasing Department website as below. Copies will not be made available at the meeting nor will they be faxed out.
- All requests for information will be answered in writing as specified below under Addenda.

REQUESTS FOR INFORMATION (RFI) / ADDENDA

Direct requests to: Town of Fairfield, Purchasing Department
Attention: Phillip Ryan, Buyer
725 Old Post Road, Fairfield, CT 06824
PRyan@fairfieldct.org

NOTE: Written requests for information will not be accepted after 12:00PM on Thursday, 3rd May, 2018.

Response will be in the form of an addendum that will be posted approximately on Wednesday, 9th May at the close of business to the Town of Fairfield Purchasing Department website: <http://www.fairfieldct.org/purchasing>

It is the responsibility of each bidder to retrieve addenda from the website. Any contact about this bid between a Bidder and any other Town official and/or department manager and/or Town of Fairfield employee, other than as set forth above, may be grounds for disqualification of that Bidder. No questions or clarifications shall be answered by phone, in person or in any other manner than specified above. Addenda will not be mailed, e-mailed or faxed out.

BID BOND / BID SECURITY

A five (5) percent bid bond, or equal approved security, as stated per the Terms and Conditions must be submitted with the proposal. Any bid submitted without such security will be excluded from the bidding process. No exceptions.

SCHEDULE

Contractor shall have site access approximately 22nd June, 2018 with substantial completion (system operating such that the building receives controlled heating) achieved no later than 29th August, 2018. Final completion (all areas of project fully completed) shall be achieved no later than 21st September, 2018.

REQUIREMENTS

- A. Prospective bidders are strongly advised to visit the site and verify the scope of the work, including measurements and quantities, prior to submitting a bid. Town reserves the right to increase or decrease the amount of work, as deemed in its best interest.
- B. Price is to include all labor, materials, permits, fees, disposal, etc., required to properly complete the project, including, but not limited to, the following:
 1. Approval by local officials as necessary, i.e. Building Department, Fire Marshal, etc.
 2. Preparation and staging as required and where specified.
 3. Plumbing and electrical.
 4. Demolition of existing boiler, piping, and all equipment as specified, including installation of new boiler, equipment, components and all other work required to complete the project.
 5. Patching, painting, clean up and proper disposal of all removed items and equipment as part of the contract.
- C. The Bidder must not discriminate, nor permit discrimination, against any person on the grounds of race, color, national origin, religion, sex, handicap, or veteran status, in their employment practices, in any of their contractual arrangements, in all service and accommodations they offer to the public, and in any of their other business operations.

REQUIREMENTS (continued)

- D. The successful bidder **MUST** secure all required permits prior to commencing work on the site. Upon application for a building permit (where required) the Town of Fairfield will waive the cost of the permit. NOTE: The Town is not able to waive the State of Connecticut Education Fee.
- E. The awarded contractor will have access to the building as indicated under “SCHEDULE” and agreed upon at award of contract. All work must be completed in a timely manner. Access to building shall be from 7:00am to 3:30pm, Monday through Friday, except for public holidays.
At the Contractor’s option, he/she may access the building on holidays, Saturdays and Sundays, if the Contractor pays the cost (including all overtime) of the custodial services for this time. All work time must be coordinated with the BOE Manager of Facilities.
- F. Award of the project, either partial or in its entirety, is contingent upon funding approval by the applicable boards of the Town of Fairfield.
- G. This is a prevailing wage project. No exceptions.

INSTRUCTION TO BIDDERS

THE WORK

1. Demolition, removal, and proper disposal of existing boiler, piping, equipment and materials as specified.
2. Supply and install new replacement boiler, including all related components, such as, but not limited to, boiler control panel, heat timer, temperature monitor and cutoffs, thermostats, tie-in to existing Johnson Controls Metasys Energy Management System, piping, fittings and valves, steam condensate, pump condensate, piping, insulation, emergency and exit lighting, etc., and all other work as specified.
3. Patch and repair walls as required, including any damaged areas caused as part of the installation. Paint any repaired walls and other areas to match existing.
4. Commissioning of new boiler and equipment.
5. **ADD ALTERNATE:** Upon testing for asbestos containing material (ACM) and if detected inside the boiler (i.e. rope gaskets between sections) the awarded Contractor shall be responsible for abatement and proper disposal offsite of such hazardous material.

NOTE: In the instance that ACM is determined to be present in existing structural conditions (i.e. ceilings, walls, flooring, windows, etc.) where existing boiler is housed, this shall be removed by others under separate contract.

PRICES

Prices quoted must be firm, for acceptance by the Town of Fairfield, for a period of ninety (90) days. Price shall include all applicable duties. Bidders shall be required to deliver awarded items at prices quoted in their original bid. The price(s) and amount of the bid will have been arrived at independently and without consultation, communication or agreement with any other contractor or bidder.

GUARANTEE

Equipment, materials and, or work executed shall be guaranteed for a minimum period of one (1) year against defective material and workmanship. The cost of all labor, materials, shipping charges and other expenses in conjunction with the replacement of defective equipment, and, or unsatisfactory work, shall be borne by the Contractor.

The Contractor shall upon written notice remedy any and all defects in materials or workmanship resulting from work done under this contract and repair any damage to any structures or property caused by the Contractor incidental to this work, all such repairs to be done in accordance with instructions furnished by the Manager of Facilities and paid for by the Contractor.

OBLIGATION OF CONTRACTOR

The Contractor shall do all the work and furnish all the materials, tools, and appliances necessary or proper for performing and completing work required by this contract in a manner specified. All the work, labor, and materials to be done and furnished under this contract shall be done and furnished strictly pursuant to and in conformity with the specifications hereto attached and other directions of the Owner, as given from time to time during the progress of the work under the terms of the contract. The Contractor shall complete all work to be done under this contract to the satisfaction of the Owner and in accordance with the specifications and drawings (where provided) herein mentioned at the prices herein agreed upon.

METHOD OF DOING WORK

The work must be started and done by the Contractor in such a manner as not to encounter delays to the traveling public owing to delays in doing the work. It must be pushed to completion with all possible speed and no inconvenience to traffic will be permitted where such inconvenience may be avoided. The Contractor shall conduct the work in such a manner so as not to interfere with or willfully annoy employees and officials of the Board of Education, employees of public utilities, residents adjacent to the work and general public.

The Contractor shall employ only competent employees to do work and whenever the Owner shall notify the Contractor, in writing, that any employee on the work is, in the Owners opinion, incompetent, unfaithful, disorderly and otherwise unsatisfactory, such employee shall be discharged from the work and shall not again be employed on it, except with the consent of the Owner. At the site of the work, the Contractor shall employ at all times while work is in progress, a construction superintendent or foreman who shall have full authority to act for the Contractor and who shall be acceptable by the Owner.

In connection with the execution of the bid, subsequent purchase orders and/or contracts, the Contractor shall not discriminate against any employee or applicant for employment because of age, race, religion, color, sex, or natural origin.

Executive order #11246 inclusive of all its amendments thereto relative to equal employment opportunities and implementation rule and regulations of the Department of Labor and equal employment opportunities are incorporated herein by specific reference.

The Town of Fairfield reserves the right to require the successful bidder(s) to enter into such security arrangements and/or written contracts as deemed necessary by the Town of Fairfield and/or Board of Education to protect the Owner's property and goods and interests.

EXECUTION OF AGREEMENT

The form of Agreement that the successful bidder will be required to execute will be decided by the Owner. The bidder to whom the Contract is awarded, must sign and deliver required copies to the Owner within seven (7) business after notice of award and receipt of Agreement forms from the Owner.

At or prior to delivery of the signed Agreement, the bidder to whom the contract is awarded shall deliver to the Owner those Certificates of Insurance required by the Contract Documents and such Labor and Materials Payment Bonds and Performance Bonds as required by the Owner.

Bonds and Certificates of Insurance shall be approved by the Owner before the successful bidder may proceed with the work. Failure or refusal to provide Bonds or Certificates of Insurance in a form satisfactory to the Owner shall subject the successful bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required material.

LIABILITY OF CONTRACTOR

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. The Contractor shall at all times safely guard and protect the work and that of adjacent property (as provided by law and the contract documents) from damage. The Contractor shall take all responsibility for the work and take precautions for preventing injuries to persons and property in or about the work. The Contractor shall assume the defense of and indemnify and save harmless the Owner and its officers, agents, and employees from all claims relating to labor and materials furnished for the work, to inventions, patents and patent rights used in doing the work, or in consequence of any improper materials, implements or labor used therein and to any act, omission or neglect of the Contractor and his/her employees therein.

The Contractor shall conduct the work in such a manner as to interfere as little as possible with travel on the highways and observe all ordinances and statutes relating to obstructing the highway. The Contractor shall provide railing or suitable barricades as good safe practice requires as outlined in the latest revised edition of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America and as required by the Owner to prevent accidents or injury to persons, vehicles or animals.

Signs warning the public of construction in the near vicinity shall be maintained at a reasonable distance from either end of the location of active construction or hazardous condition arising therefrom. All barricades, machinery and other hazards or obstructions to the public use of the highway shall be brightly and properly lighted at night.

ASSIGNMENTS

The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of the contract or any portion thereof or of the work provided for therein, or of his/her right, title, interest therein, to any person, firm, partnership or corporation without the written consent of the Owner. If any part of the work is sublet, sold, transferred, assigned or otherwise disposed of, the Contractor will not be relieved of any responsibility in connection therewith. The Contractor may not subcontract a total of work in excess of 50% of the original total contract value.

EXTRA WORK

The Owner shall notify the Contractor, in writing, of the necessity of such extra work, stipulating its character and extent. Upon receipt of such notification, the Contractor shall advise the Owner, in writing, of the compensation, whether unit price or lump sum as requested, for which he/she proposes to perform the extra work required. The Owner may accept the compensation proposed by the Contractor, or if the Owner considers the prices submitted to be excessive, the Owner may order the work done on a "Cost Plus" basis. In either case, the character and extent of the extra work together with the accepted basis of compensation shall be communicated to the Contractor by means of a change order which, when signed by the Contractor and the Owner, shall become part of the contract.

Unforeseen work made necessary by changes in plan or work necessary to complete the improvements for which no price is provided in the contract, shall be done in accordance with the requirements of the specifications and as directed by the Owner.

RIGHT OF OWNER TO TERMINATE CONTRACT

If the work to be done under this Contract shall be abandoned, or if at any time the Owner is of the opinion that the Contractor is willfully violating any of the conditions of this contract or is not executing said contract in good faith or that the work is unnecessarily delayed and will not be finished within the prescribed time, the Owner may notify the Contractor and Surety, in writing to that effect. If the Contractor does not, within five (5) business days thereafter, take such measures as will, in the judgment of the Owner, insure the satisfactory completion of the work aforesaid, the Owner shall have the power to notify the Contractor to discontinue all work or any portion thereof, under this contract. A copy of this contract shall go to the surety.

Thereupon the Contractor shall cease to continue said work, on such part thereof as the Owner shall designate. The Owner shall thereupon have the power to place such and so many persons as deemed proper, by contract or otherwise, to work at and complete the work herein described and to use such materials, tools, and appliances found upon the work or to procure other materials, tools, and appliances for the completion of the same and charge the expenses of said labor, materials, tools, and appliances to the Contractor; and the expense so charged shall be deducted and paid by the Owner out of such money as may be then due, or may at any time thereafter grow due to the Contractor under and by virtue of this agreement, or any part thereof; and in case the expense so charged is less than the sum which would have been payable under this contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference; and in case greater, the Contractor shall pay amount of such excess so due.

DEFINITIONS

Whenever the words defined occur in this Contract and in the specifications hereto attached, they shall have the meanings here given:

1. Owner: The Owner shall mean the Town of Fairfield (Town) or any duly authorized official thereof acting in an official capacity.
2. Contractor: Whenever the word "Contractor" is used in these specifications, it shall be understood to mean the person or persons, co-partnership or corporation, who has entered into this contract as the party of the second part, or his/her or their legal representative.
3. Sub-Contractor: Any individual, firm, partnership, or corporation to whom the Contractor sublets or assigns any part or parts of the project covered by the contract with the approval of the Owner.

DRAWING CONFLICT

In the event of conflict between the drawings (where provided) and specifications, the more stringent shall apply and be included in the contract.

TERMS AND CONDITIONS OF BID

In order to receive consideration, make bids in strict accordance with the following:

1. Make bids upon the forms provided, properly signed and with all items filled out. Do not change the wording of the bid form, and do not add words to the bid form. Unauthorized conditions, limitations, or provisions attached to the bid may be cause for rejection of the bid. If alterations by erasure or interlineations are made for any reason, explain over such erasure or interlineations with a signed statement from the bidder.

2. Bid proposals are to be submitted in a sealed envelope and clearly marked with the bid number “2018-68” on the outside of the envelope. All prices and notations must be printed in ink or typewritten. No erasures permitted. Bid proposals are to be in the office of the Purchasing Agent, First Floor, Independence Hall, 725 Old Post Road, Fairfield, Connecticut, prior to date and time specified, at which time they will be publicly opened. It is the sole responsibility of the bidder to see that the bid is received on time.
3. No telegraphic bid or telegraphic modification of a bid will be considered. No bids received after the time fixed for receiving them will be considered. Late bids will be returned to the bidder unopened.

PROTESTS

No protest regarding the validity or appropriateness of the specifications or of the invitation for bids will be considered, unless the protest is filed in writing with the Director of Purchasing, prior to the closing date for the bids.

EXCEPTION TO SPECIFICATIONS

All bid proposals rendered shall be considered meeting the attached specifications unless exceptions are noted on a separate page dated and signed by the bidder.

EXAMINATION OF DOCUMENTS AND SITE OF WORK

Before submitting a bid, each bidder shall examine the drawings (where provided) carefully, shall read the specifications and all other proposed contract documents, and shall visit the site of the Work. Each bidder shall be fully informed prior to bidding as to existing conditions and limitations under which the Work is to be performed, and shall include in the bid a sum to cover the cost of items necessary to perform the Work set forth in the proposed contract documents. No allowance will be made to a bidder because of lack of such examination or knowledge. The submission of a bid will be considered conclusive evidence that the bidder has made such examination.

Bidders must examine for themselves the plans, profiles, detail drawings, specifications, etc and the location of the proposed work, and must exercise their judgment as to the nature and difficulty of the whole proposed undertaking. The Contractor must assume all risk or variance in any computation or statement by the contract, by whomsoever made and must agree to furnish all tools, machinery, material and labor to clean up, all debris and to complete fully the said work in accordance with the plans and contained either in the specifications or in any of the drawings but omitted from the other will be considered an essential part of the work. The Contractor whose bid is accepted will be responsible for every loss or error arising from ignorance concerning the requirements of the work of the difficulties to be encountered.

Bidders, if requested, must be able to present satisfactory evidence that they have been regularly engaged in the business of constructing such work as they propose to execute and that they are fully prepared with the necessary capital, materials, and machinery to conduct the work to be contracted for the satisfaction of the Owner and to begin work promptly when ordered.

The Owner, or its designated representative, reserves the right to reject any proposal in whole or in part offering equipment and/or materials and/or construction proposals, which in his/her opinion does not meet the quality standards desired. Such decision will be considered final and not subject to further recourse.

INTERPRETATION OF CONTRACT DOCUMENTS PRIOR TO BIDDING

Any person contemplating submitting a bid for the construction of the work is in doubt as to the true meaning of any part of the proposed contract documents, or finds discrepancies in or omissions from any part of the proposed contract documents, he/she may submit to the person responsible a written request for interpretation thereof no later than the time and date as indicated. The person submitting the request shall be responsible for its prompt delivery.

Interpretation of correction of proposed Contract Documents will be made only by Addendum posted to the Town of Fairfield, Purchasing Department website at www.fairfieldct.org/purchasing

The Owner will not be responsible for any other explanations or interpretations of the proposed Contract Documents.

PRE-CONSTRUCTION MEETING

Prior to the commencement of any work, the contractor shall attend the pre-construction meeting at a date and time set that is convenient to all parties.

CHANGE ORDERS

The maximum amount of overhead and profit that will be permitted on any change order is a total amount of 10%.

BID PROPOSAL FORM

PAGE 1 OF 3

PROPOSAL TO: Town of Fairfield, Purchasing Department
First Floor, Sullivan Independence Hall
725 Old Post Road, Fairfield, Connecticut 06824

I, _____ have received the following contract documents,

1. Bid Document #2018-68
2. Prevailing Wage Bid Package
3. Contract Documents prepared by Dumitru T. Petrescu, P.E., LLC.
4. Addenda ___ through ___ posted at www.fairfieldct.org/purchasing and have included their provisions in my proposal to supply all labor, materials, tools, equipment, permits, taxes and insurances, etc., and in accordance with the contract documents, to perform demolition and proper disposal of one (1) existing boiler; furnish and install one (1) new Weil McLain, 88 Series 2, model BGL-1088SF boiler with dual fuel powerflame burner, model C2-GO-20B1 (or Owner approved equal manufacturer).

BASE BID:

(\$ _____) /lump sum _____ Dollars
(Written Amount)

ADD ALTERNATE: Abatement of ACM / Hazardous Material from Boiler

(\$ _____) /lump sum _____ Dollars

Lump sum amount shall include the cost of all labor, materials, equipment, tools, mobilization, delivery, permits (where not waived by the Town), licenses, overhead and profit, taxes (except from which Owner is exempt) and insurances.

UNIT PRICES:

Non-Holding Valves:

1/2"	\$ _____/ea	<u>Schedule of Values:</u>	
3/4"	\$ _____/ea	General Cond:	\$ _____
1"	\$ _____/ea	Staging:	\$ _____
1-1/4"	\$ _____/ea	Sheetmetal:	\$ _____
1-1/2"	\$ _____/ea	Mechanical:	\$ _____
2"	\$ _____/ea	Electrical:	\$ _____
2-1/2"	\$ _____/ea	Plumbing:	\$ _____
3"	\$ _____/ea	Masonry:	\$ _____
4"	\$ _____/ea	Insulation:	\$ _____
5"	\$ _____/ea	Finishes:	\$ _____
6"	\$ _____/ea	Specialties:	\$ _____
8"	\$ _____/ea	Incidental:	\$ _____

Base Bid Grand Total: \$ _____

BID PROPOSAL FORM

PAGE 2 OF 3

Provide details of equipment to be installed:

Boiler #1:

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

Boiler #2:

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

Description: _____

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

Description: _____

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

Description: _____

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

Description: _____

Manufacturer: _____

Model / Series: _____

Description: _____

Warranty: _____

A complete itemized schedule of values shall be required to be provided by the Contractor, prior to award of contract.

The Bidder hereby certifies that any and all defects, errors, inconsistencies or omissions of which he/she is aware, either directly or by notification from any sub-bidder or material supplier found in the Contract Documents are listed herewith in this Bid Form.

Signature

Date

BID PROPOSAL FORM

PAGE 3 OF 3

Hourly Rates: Supervisor \$ _____/hr Foreman \$ _____/hr Journeyman \$ _____/hr Apprentice \$ _____/hr

Mark-up over Cost for Materials shall be _____% for any additional work where requested.

Work shall be completed _____ days after receipt of written notice to proceed / purchase order.

A complete itemized schedule of values shall be required to be provided by the Contractor, prior to award of contract.

Provide information regarding number of years in business, size of firm, and facility location.

Number of years in business: _____ Number of employees: _____ (full time) _____ (part time)

Facility Location: _____ (Town) _____ (State)

CHECKLIST

The following must be submitted with proposal:

- Cover page, completed and signed.
- Addenda (where issued) acknowledged on Bid Proposal Form.
- List of references where projects performed of comparable size and scope within the past three years.
- Schedule of values.
- List of all sub-contractors identifying each trade, hourly rates, and Tax ID number.
- Prices submitted contain Prevailing Wage Rates. (No Exceptions)
- Bid Bond or equal approved security. (No Exceptions)
- Exceptions itemized and attached to Bid Form.

The Bidder hereby certifies that any and all defects, errors, inconsistencies or omissions of which he/she is aware, either directly or by notification from any sub-bidder or material supplier found in the Contract Documents are listed herewith in this Bid Form.

Name of Authorized Representative (Printed)

Title

Signature

Date

**PURCHASING AUTHORITY
TOWN OF FAIRFIELD
INSTRUCTIONS FOR BIDDERS
TERMS AND CONDITIONS OF BID**

BID PROPOSALS

Bid proposals are to be submitted in a sealed envelope and clearly marked on the outside “BID #2018-68” including all outer packaging such as DHL, FedEx, UPS, etc. All prices and notations must be printed in ink or typewritten. No erasures are permitted. Bid proposals are to be in the office of the Purchasing Authority, First Floor, Independence Hall, 725 Old Post Road, Fairfield, Connecticut, prior to date and time specified, at which time they will be publicly opened.

RIGHT TO ACCEPT / REJECT

AFTER REVIEW OF ALL FACTORS, TERMS AND CONDITIONS, INCLUDING PRICE, THE PURCHASING AUTHORITY OF THE TOWN OF FAIRFIELD RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS, OR ANY PART THEREOF, OR WAIVE DEFECTS IN SAME, OR ACCEPT ANY PROPOSAL DEEMED TO BE IN THE BEST INTEREST OF THE TOWN OF FAIRFIELD.

QUESTIONS

Questions concerning conditions, bidding guidelines and specifications should only be directed in writing to:

Mr. Phillip Ryan, Buyer: PRyan@fairfieldct.org

Inquiries must reference date of bid opening, requisition or contract number, and must be received no later than as indicated in the bid documents prior to date of bid opening. Failure to comply with these conditions will result in the bidder waiving the right to dispute the bid specifications and conditions.

PRICES

Prices quoted must be firm, for acceptance by the Town of Fairfield, for a period of ninety (90) days. Prices shall include all applicable duties. Bidders shall be required to deliver awarded items at prices quoted in their original bid.

F.O.B. DESTINATION

Prices quoted shall be Net – Delivered to destination. Bids quoting other than F.O.B. Destination may be rejected.

BID BOND

The BID BOND furnished, as bid security, must be duly executed by the bidder as principal. It must be in the amount equal to five percent (5%) of the total estimated bid, as guarantee that, in case the contract is awarded to the bidder, the bidder will, within ten days thereafter, execute such contract and furnish a Performance Bond and Payment Bond.

Small businesses may elect to obtain an irrevocable letter of credit or cashier’s check in lieu of the Bid Bond. Such surety must also be in an amount equal to at least five percent (5%) of the total estimated bid.

All bid bonds shall be written by a surety company or companies licensed in the State of Connecticut, and shall have at least an A-VII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if an approved surety bond cannot be provided, the bidder shall be deemed non-responsive.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

NOTE: Failure to provide a Bid Bond or equivalent security is not cause for a waiver defect. Any bid not accompanied by such security will be excluded from consideration.

PERMITS

The contractor will be responsible for securing all necessary permits, state and local, as required by the Town of Fairfield. The Town will waive its application and permit fees for Town of Fairfield projects.

PAYMENT PROCEDURES

No voucher, claim or charge against the Town shall be paid without the approval of the Fiscal Officer for correctness and legality. Appropriate checks shall be drawn by the Fiscal Officer for approved claims or charges and they shall be valid without countersignature unless the Board of Selectmen otherwise prescribed.

PAYMENT PERIOD

The Town of Fairfield shall put forth its best effort to make payment within thirty days (30) after delivery of the item acceptance of the work, or receipt of a properly completed invoice, whichever is later. Payment period shall be net thirty days (30) unless otherwise specified. For projects that do not require a performance or bid bond, The Town of Fairfield reserves the right to retain five percent (5%) of total bid amount, which is payable ninety (90) days after final payment or acceptance of the work.

THE CONTRACTOR

The Contractor for the work described shall be thoroughly familiar with the requirements of all specifications, and the actual physical conditions of various job sites. The submission of a proposal shall be construed as evidence that the Contractor has examined the actual job conditions, requirements, and specifications. Any claim for labor, equipment, or materials required, or difficulties encountered which could have been foreseen had such an examination been carefully made will not be recognized.

ASSIGNMENT OF CONTRACT

No contract may be assigned or transferred without the consent of the Purchasing Authority.

AWARD OF BIDS

Contracts and purchases will be made or entered into with the lowest responsible bidder meeting specifications, except as otherwise specified in the invitation. If more than one item is specified in the invitation, the Town of Fairfield reserves the right to determine the low bidder on an individual basis or on the basis of all items included in the Invitation for Bids, unless otherwise expressed by the Town.

PERFORMANCE AND LABOR AND MATERIAL BOND

The successful bidder, within seven (7) business days after notification of award, will be required to furnish Performance and Labor and Material Bond provided by a company authorized to issue such bonds in the State of Connecticut, or Certified Check or properly executed Irrevocable Letter of Credit equal to a hundred per cent (100%) of the award.

In the event that the Contractor where required to provide evidence of insurance and a performance bond does not do so before beginning work, the Town of Fairfield reserves the right to withhold payment from such supplier until the evidence of insurance and performance bond has been received by the Town.

All payment and performance bonds shall be written by a surety company or companies licensed to issue bonds in the State of Connecticut, and shall have at least an A-VIII policy holders rating, as reported by A.M. Best Rating Services, or otherwise deemed acceptable by the Town. The Town always reserves the right to reject surety companies, if approved surety bonds cannot be provided the contract shall be terminated.

A complete list of certified surety companies can be accessed on the U.S. Government Department of Treasury website: https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm

BOND REQUIREMENT – NON-RESIDENT CONTRACTORS

1. Non-resident contractors are required to deposit with the Department of Revenue Services a sum equivalent to 5% of the total contract value, as assurance that personal property taxes and/or any other State taxes assessed and due the State during the contract will be paid.
2. If this surety is not deposited with the State, the Town is required to deduct and submit to the State 5% of the total contract value.

GUARANTEE

Equipment, materials and/or work executed shall be guaranteed for a minimum period of one (1) year against defective material and workmanship. The cost of all labor, materials, shipping charges and other expenses in conjunction with the replacement of defective equipment, and/or unsatisfactory work, shall be borne by the Contractor.

CATALOGUE REFERENCE

Unless expressly stated otherwise, any and all reference to commercial types, sales, trade names and catalogues are intended to be descriptive only and not restrictive; the intent is to indicate the kind and quality of the articles that will be acceptable. Bids on other equivalent makes, or with reference to other catalogue items will be considered. The bidder is to clearly state exactly what will be furnished. Where possible and feasible, submit an illustration, descriptive material, and/or product sample.

OSHA

The bidder will certify all equipment complies with all regulations and conditions stipulated under the Williams-Steiger Occupational Safety and Health Act of 1971, as amended. The successful bidder will further certify that all items furnished under this project will conform and comply with Federal and State of Connecticut OSHA standards. The successful bidder will agree to indemnify and hold harmless the Town of Fairfield for any and all damages that may be assessed against the Town.

LIFE CYCLE COSTING

Where applicable, Life Cycle Costing will be used as a criterion for awarding bids. This is a method of calculating total cost of ownership of an item over the life of the product, which may include operation and maintenance expenses, transportation, salvage value, and/or disposal costs.

INSURANCE

The Contractor shall not commence any work under the Contract until all insurance required by this section has been obtained and Certificates of Insurance and any other evidence of required coverage requested by the Town, including a copy of the policy itself, have been received and approved by the Town.

Such policies shall stipulate that no coverage can be changed or canceled, including for non-payment of premium, unless the Town has had thirty (30) days prior notice in writing. Certificates of renewals or changes in policies shall be delivered to the Owner at least thirty (30) days prior to the expiration of the policy.

All insurance issuers chosen by the Contractor must be licensed to do business in the State of Connecticut and rated A- or better by A.M. Best Rating Services.

The Town always reserves the right to reject insurance companies, if approved insurance policies cannot be provided the contract shall be terminated.

The insurance requirements set forth below are minimum limits of coverage only and in no way limit the Contractor's liability.

The following insurance is required to be maintained in full force until all work required by the contract has been fully completed, except that Products/Completed Operations coverage shall be maintained for five (5) years.

Worker's Compensation Insurance: The Contractor shall carry Worker's Compensation and Employer's Liability Insurance in the form and in such amounts as may be currently required to comply with the Labor Laws of the State of Connecticut.

Automobile Insurance: The Contractor shall carry and maintain during the life of the Contract a policy with a combined single limit of \$2,000,000 and rider CA9948 or equivalent.

This policy shall include all liability of the Contractor arising from the operation of all self-owned motor vehicles used in the performance of the Contract; and shall also include a "non-Ownership" provision covering the operation of motor vehicles not owned by the Contractor, but used in the performance of the work.

Commercial General Liability:

- Bodily Injury and Property Damage \$2,000,000
- Products/Completed Operations \$2,000,000

This policy shall include Subcontractor's Liability coverage, protecting the Contractor and the Town against liability arising out of the activities of Subcontractors engaged by him in the performance of the work.

Umbrella Policy: An umbrella policy in the amount of \$5,000,000, covering general liability, auto liability, and employer liability is required.

Pollution Liability Insurance: Where applicable, a policy in the amount of \$5,000,000 including coverage for transport and other offsite risks. Such policy must be given to the Town for review and determination of acceptability before an award will be made.

Waiver of Subrogation: Waiver of subrogation is required on all policies.

Additional Insureds: The Town of Fairfield, Fairfield Board of Education, its officers, officials, employees, agents, Boards, and Commissions shall be named as Additional Insureds. The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Fairfield. A waiver of subrogation applies under general liability, auto liability and workers compensation.

The coverage shall be primary and non-contributory and contain no special limitations on the scope of protection afforded to the Town of Fairfield. A waiver of subrogation applies under general liability, auto liability and workers compensation.

Subcontractor's Insurance: Each Subcontractor engaged by the Contractor to perform any work under the Contract shall obtain all insurance required of the Contractor in the same amounts and subject to the same provisions specified above for the Contractor, including the Additional Insured requirement. Certificates of Insurance shall be submitted to the Contractor and the Town and approved by the Town, before commencing any work.

HOLD HARMLESS

Contractor shall defend, indemnify, and hold harmless the Town of Fairfield, its officers, employees, agents or volunteers, from and against any and all claims and demands of any nature for any loss, damage or injury which any person may suffer by reason of, or in any way arising out of, this Agreement, unless caused by the sole negligence of the Town.

FEDERAL, STATE, AND LOCAL LAWS

All applicable Federal, State and local laws, rules and regulations of all authorities having jurisdiction over the locality of the project shall apply to the contract and are deemed to be included herein. If the total amount of the project, including any current or future change orders, exceeds \$100,000.00 all work is to be done in accordance with Connecticut Department of Labor (CT-DOL) rules and regulations. More information may be obtained from: www.ctdol.state.ct.us

The Davis-Bacon and Related Acts, shall apply to contractors and subcontractors performing on federally funded or assisted contracts in excess of \$2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. More information may be obtained from: <https://www.dol.gov/whd/govcontracts/dbra.htm>

NOTE: The Town shall apply the most current wage decision applicable at the time of contract award.

CONFLICT OF INTEREST

No officer or employee or member of any elective or appointive board, commission or committee of the Town, whether temporary or permanent, shall have or acquire any financial interest gained from a successful bid, direct or indirect, aggregating more than one hundred dollars (\$100.00), in any project, matter, contract or business within his/her jurisdiction or the jurisdiction of the board, commission, or committee of which he/she is a member. Nor shall the officer / employee / member have any financial interest, direct or indirect, aggregating more than one hundred dollars (\$100.00) in any contract or proposed contract for materials or services to be furnished or used in connection with any project, matter or thing which comes under his/her jurisdiction or the jurisdiction of the board, commission, committee of which he/she is a member.

SCOPE OF WORK/SITE INSPECTIONS

The bidder declares that the scope of the work has been thoroughly reviewed and any questions resolved (see above for name and number of individual to contact for questions). If applicable, the bidder further declares that the site has been inspected as called for in the specifications (q.v.).

EXCEPTION TO SPECIFICATIONS

No protest regarding the validity or appropriateness of the specifications or of the Invitation for Bids will be considered, unless the protest is filed in writing with the Purchasing Authority prior to the closing date for the bids. All bid proposals rendered shall be considered meeting the attached specifications unless exceptions are noted on a separate page dated and signed by the bidder.

UNLESS OTHERWISE NOTED

It will be assumed that all terms and conditions and specifications will be complied with and will be considered as part of the Bid Proposal.

TAX EXEMPT

Federal Tax Exemption 06-6001998.

Exempt from State Sales Tax under State General Statutes Chapter 219-Section 12-412 Subsection A.

No exemption certificates are required and none will be issued.

REFERENCES

Provide details of most recently performed and completed projects of equal scope:

REFERENCE #1:

Project Location		Contract Price	Completion Date
_____		_____	_____
Owner / Architect	Contact Person	Phone	E-mail
_____	_____	_____	_____
Description of the Work			

REFERENCE #2:

Project Location		Contract Price	Completion Date
_____		_____	_____
Owner / Architect	Contact Person	Phone	E-mail
_____	_____	_____	_____
Description of the Work			

REFERENCE #3:

Project Location		Contract Price	Completion Date
_____		_____	_____
Owner / Architect	Contact Person	Phone	E-mail
_____	_____	_____	_____
Description of the Work			

This page must be fully completed and submitted with your proposal, including accurate contact names and contact details. Prospective bidders may opt to submit own formatted reference sheets with complete project details and contact information.

SUBCONTRACTORS

Provide subcontractor details if any are to be employed as part of this contract, including labor rates:

SUBCONTRACTOR #1:

Name of Company _____ Fed ID # _____
Contact Person _____ Title _____
Company Address _____ Phone _____
Trade _____ E-mail _____
Rates: Supervisor \$ _____/hr Foreman \$ _____/hr Journeyman \$ _____/hr Apprentice \$ _____/hr

SUBCONTRACTOR #2:

Name of Company _____ Fed ID # _____
Contact Person _____ Title _____
Company Address _____ Phone _____
Trade _____ E-mail _____
Rates: Supervisor \$ _____/hr Foreman \$ _____/hr Journeyman \$ _____/hr Apprentice \$ _____/hr

SUBCONTRACTOR #3:

Name of Company _____ Fed ID # _____
Contact Person _____ Title _____
Company Address _____ Phone _____
Trade _____ E-mail _____
Rates: Supervisor \$ _____/hr Foreman \$ _____/hr Journeyman \$ _____/hr Apprentice \$ _____/hr

SUBCONTRACTOR #4:

Name of Company _____ Fed ID # _____
Contact Person _____ Title _____
Company Address _____ Phone _____
Trade _____ E-mail _____
Rates: Supervisor \$ _____/hr Foreman \$ _____/hr Journeyman \$ _____/hr Apprentice \$ _____/hr

NOTE: All sub-contractors are subject to approval by the Town of Fairfield and are required to provide Fed ID #.

TOWN OF FAIRFIELD

FAIRFIELD PUBLIC SCHOOLS

BOILER REPLACEMENT AT HOLLAND HILL ELEMENTARY SCHOOL

BID #2018-68

March 27, 2018

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Furnished by the Town of Fairfield

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Boiler Room - Mechanical Plan

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Boiler Room - Electrical Demolition Plan

DRAWING E-1

Boiler Room - Electrical Plan

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

RELATED SECTIONS

General Conditions
Supplemental General Conditions
Other Sections of Division One
Specific Project Requirements

SYSTEM DESCRIPTION

The Project consists of the following:

These Contractors shall provide all equipment, devices, materials, labor, superintendence, transportation, plant & tools necessary for properly constructing within the time stipulated the indicated work necessary for the proper completion of the project, as shown on drawings and specified herein.

The Scope of Work consists in Boiler Replacement work, and includes demolition, rigging and transportation of (1) existing boiler/burner unit to be removed & disposed of in a legal manner, and (1) new boiler/burner assembly (erected, tested and certified at site) replacing existing at same location, new steam, steam condensate, natural gas, fuel oil and drain piping, fittings & valves, new piping insulation, controls & instrumentation, power to all new equipment & devices, and connections of all new equipment to the existing Energy Management System (EMS) etc., as required for complete operational systems, approved by the local authorities having jurisdiction, Project Engineer and Owner's Representative(s). All existing equipment and devices indicated to be removed shall be disposed of in a legal manner unless otherwise indicated.

The Owner shall be responsible to remove all asbestos content materials throughout this Boiler Room, prior to starting any work under this project. However, if any asbestos content materials or any other hazardous materials are encountered during this work, by the above mentioned Contractors, they will stop work in the areas affected and report any and all findings to the Engineer.

Note, that this project is a Prevailing Wage Rates project.

The General Contractor shall be a licensed Mechanical Contractor.

The work is scheduled, as indicated in the Bidding Requirements furnished by the Town of Fairfield.

The work shall be completed as indicated in the Bidding Requirements schedule. No interruption of existing utilities, including power will be permitted, unless scheduled at least 48 hours in advance with the Owner's

SECTION 01010 - SUMMARY OF WORK

representative(s). Close coordination with the Owner's representative(s) is a must, in order to complete the Work above described, in a timely and efficient manner.

The regular working hours are 7:00 AM to 3:30 PM. However, this work could be extended until 11:00 PM at Owner's discretion, if so necessary.

Also, since the Holland Hill E.S. is an operating facility, close coordination with the Owner's representative(s) will be required for parking, deliveries and storage on site.

Asbestos material encountered in the existing structure of this Project and its treatment or removal is not part of the work. The disposition of such material will be the responsibility of the Town of Fairfield. This Contractor shall be required to stop work and notify immediately the Project Engineer and Town of Fairfield, if any asbestos-related materials are found on premises.

WORK SEQUENCE

The work will be conducted in the most expedient manner to provide the least possible interferences to the activities of the Owner.

CONTRACTOR USE OF PREMISES

Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy.

OCCUPANCY REQUIREMENTS

Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Coordinate with Owner areas for parking, delivery or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

Maintain the existing building in a weather tight condition throughout the construction period. Repair damages caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

The Owner will occupy the site and existing building during the entire construction period. Cooperate and coordinate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

PART 2 - PRODUCTS

Refer to specific products in each section.

SECTION 01010 - SUMMARY OF WORK

PART 3 - EXECUTION

Refer to specific in each section.

END OF SECTION

01010-3

Boiler Replacement at Holland
Hill E.S.

SECTION 01039 - COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination.
- B. Alteration project procedures.
- C. Cutting and patching.
- D. Preconstruction conference.
- E. Progress meetings.

1.02 RELATED SECTIONS

- A. Section 01041 - Project Coordination.
- B. Section 01045 - Cutting and Patching.

1.03 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with walls. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished spaces, conceal pipes and wiring within construction.
- E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in

SECTION 01039 - COORDINATION AND MEETINGS

accordance with Contract Documents, to minimize disruption of Owner's activities.

1.04 ALTERATION PROJECT PROCEDURES

- A. Materials: As specified in product Sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.

1.05 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations

SECTION 01039 - COORDINATION AND MEETINGS

of mechanical and electrical Work.

- D. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Identify any hazardous substance or condition exposed during the Work to the Engineer for decision or remedy.

1.06 PRECONSTRUCTION CONFERENCE

- A. Owner and Engineer will schedule a conference after Notice of Award.
- B. Attendance Required: Owner, Engineer and Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
 - 5. Designation of personnel representing the parties in Contract, and the Engineer.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
 - 7. Scheduling.

1.07 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the

SECTION 01039 - COORDINATION AND MEETINGS

Work at maximum bi-monthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Engineer, Owner, participants, and those affected by decision made.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01041 - PROJECT COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project coordination administrator.
- B. Construction mobilization.
- C. Schedules.
- D. Submittals.
- E. Coordination drawings.
- F. Closeout procedures.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01039 - Coordination and Meetings.
- C. Section 01700 - Contract Closeout.

1.03 PROJECT COORDINATION ADMINISTRATOR

- A. Project Coordination Administrator: Engineer.

1.04 CONSTRUCTION MOBILIZATION

- A. Cooperate with the Administrator in allocation of mobilization areas of site; for site access, traffic and parking facilities.
- B. During construction, coordinate use of site and facilities through the Administrator.
- C. Comply with Administrator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Administrator for use of temporary utilities and construction facilities.
- E. Coordinate filed engineering and layout work under instructions of the Administrator.

1.05 SCHEDULES

SECTION 01041 - PROJECT COORDINATION

- A. Submit preliminary progress schedule in accordance with Section 01300.
- B. After review, revise and resubmit schedule to comply with revised Project schedule.
- C. During progress of Work, revise and resubmit as directed with Applications for Payment.

1.06 SUBMITTALS

- A. Submit preliminary shop drawings, product data and samples in accordance with Section 01300 for review and compliance with Contract Documents, for field dimensions and clearances, for relation to available space. Revise and resubmit as required.
- B. Submit applications for payment on AIA G702 forms for review, and for transmittal to Engineer.
- C. Submit requests for interpretation of Contract Documents, and obtain instructions through Administrator.
- D. Process requests for substitutions, and change orders, through Administrator.
- E. Deliver closeout submittals for review and preliminary inspection reports, for transmittal to Engineer.

1.07 COORDINATION DRAWINGS

- A. Provide information required by Administrator for preparation of coordination drawings.
- B. Review drawings prior to submission to Engineer.

1.08 CLOSEOUT PROCEDURES

- A. Notify Administrator when Work is considered ready for Substantial Completion. Accompany Administrator on preliminary inspection to determine items to be listed for completion or correction in Contractor's notice of Substantial Completion.
- B. Comply with Administrator's instructions to correct items of Work listed in executed Certificates of Substantial Completion.

SECTION 01041 - PROJECT COORDINATION

- C. Notify Administrator when Work is considered finally complete. Accompany Administrator on preliminary final inspection.
- D. Comply with Administrator's instructions for completion of items of Work determined by the Engineer's final inspection.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01045 - CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01300 - Submittals.
- C. Section 01600 - Materials and Equipment.
- D. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to work of the Section.
 - 2. Advance notification to other Sections of openings required in work of those Sections.
 - 3. Limitations on cutting structural members.

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather-exposed or moisture-resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- B. Include in request:
 - 1. Identification of Project.
 - 2. Location and description of affected work.
 - 3. Necessity for cutting or alteration.
 - 4. Description of proposed work, and products to be used.
 - 5. Alternatives to cutting and patching.
 - 6. Effect on work of Owner or separate contractor.
 - 7. Written permission of affected separate contractor.
 - 8. Date and time work will be executed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials,

SECTION 01045 - CUTTING AND PATCHING

submit request for substitution under provisions of Section 01600.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing work, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

3.03 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete work.
- B. Fit products together, to integrate with other work.
- C. Uncover work to install ill-timed work.
- D. Remove and replace defective or non-conforming work.
- E. Provide openings as required for penetrations of mechanical and electrical work.

3.04 PERFORMANCE

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and

SECTION 01045 - CUTTING AND PATCHING

sight-exposed surfaces.

- C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- D. Restore work with new products in accordance with requirements of Contract Documents.
- E. Fit work air tight to pipes, sleeves, conduit, and other penetrations through surfaces.
- F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated fire resistant material to full thickness of the penetrated element. When filling, patching penetrations the wall/floor assembly must be brought back to relevant fire rating.
- G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01090 - REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance.
- B. Schedule of references.

1.02 RELATED SECTIONS

- A. Section 01001 - General Conditions.

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCES

AABC Associated Air Balance Council
 1000 Vermont Avenue, N.W.
 Washington, DC 20005

ACI American Concrete Institute
 Box 19150
 Reford Station
 Detroit, MI 48219

ADC Air Diffusion Council

SECTION 01090 - REFERENCE STANDARDS

230 North Michigan Avenue
Chicago, IL 60601

AGC Associated General Contractors of America
1957 E Street, N.W.
Washington, DC 20006

AIA American Institute of Architects
1735 New York Avenue, N.W.
Washington, DC 20006

AMCA Air Movement and Control Association
30 West University Drive
Arlington Heights, IL 60004

ANSI American National Standards Institute
1430 Broadway
New York, NY 10018

ASHRAE American Society of Heating, Refrigerating and
Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, GA 30329

ASME American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

AWS American Welding Society
550 LeJeune Road, N.W.
Miami, FL 33135

AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

CDA Copper Development Association
57th Floor, Chrysler Building
405 Lexington Avenue
New York, NY 10174

EJCDC Engineers' Joint Contract Documents
Committee
American Consulting Engineers Council
1015 15th Street, N.W.

01090-2 Boiler Replacement at Holland
Hill E.S.

SECTION 01090 - REFERENCE STANDARDS

Washington, DC 20005

EJMA Expansion Joint Manufacturers Association
25 North Broadway
Tarrytown, NY 10591

FM Factory Mutual System
1151 Boston-Providence Turnpike
P.O. Box 688
Norwood, MA 02062

FS Federal Specification
General Services Administration
Specifications and Consumer Information
Distribution Section (WFSIS)
Washington Navy Yard, Bldg. 197
Washington, DC 20407

IEEE Institute of Electrical and Electronics
Engineers
345 East 47th Street
New York, NY 10017

MIL Military Specification
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120

NCMA National Concrete Masonry Association
P.O. Box 781
Herndon, VA 22070

NEBB National Environmental Balancing Bureau
8224 Old Courthouse Road
Vienna, VA 22180

NEMA National Electrical Manufacturers' Association
2101 'L' Street, N.W.
Washington, DC 20037

NFPA National Fire Protection
Association
Battery March Park
Quincy, MA 02269

PS Product Standard
U. S. Department of Commerce
Washington, DC 20203

SECTION 01090 - REFERENCE STANDARDS

SMACNA Sheet Metal and Air Conditioning Contractors'
 National Association
 8224 Old Court House Road
 Vienna, VA 22180

SSPC Steel Structures Painting Council
 4400 Fifth Avenue
 Pittsburgh, PA 15213

UL Underwriters' Laboratories, Inc.
 333 Pfingston Road
 Northbrook, IL 60062

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01300 - SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Shop drawings.
- E. Product data.
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control: Manufacturers' field services and reports.
- B. Section 01700 - Contract Closeout: Contract warranty and manufacturer's certificates closeout submittals.

1.03 SUBMITTAL PROCEDURES

- A. Provide nine (9) copies for each submittal with Engineer accepted form.
- B. Submit only products of approved manufacturers, as specified at each individual section. Substitutions will not be granted.
- C. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- E. Apply Contractor's stamp, signed or initialled certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

SECTION 01300 - SUBMITTALS

- F. Schedule submittals to expedite the Project, and deliver to Engineer. Coordinate submission of related items.
- G. Identify variations from Contract Documents or system limitations which may be detrimental to successful performance of the completed Work.
- H. Provide space for Contractor and Engineer review stamp.
- I. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.04 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within 7 days after date of Owner-Contractor Agreement established for Engineer review.
- B. Revise and resubmit as required.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Indicate estimated percentage of completion for each item of Work at each submission.
- E. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.05 PROPOSED PRODUCTS LIST

- A. Within 7 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06 SHOP DRAWINGS

- A. Submit the number of opaque reproductions which Contractor

SECTION 01300 - SUBMITTALS

requires, plus two copies which will be retained by Engineer.

- B. After review, reproduce and distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 - Contract Closeout.

1.07 PRODUCT DATA

- A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Engineer.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.08 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns Engineer's selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number or samples specified in individual specification Sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.09 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

SECTION 01300 - SUBMITTALS

- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturers' certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01400 - QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References.
- C. Manufacturers' field services and reports.

1.02 RELATED SECTIONS

- A. Section 01090 - Reference Standards.
- B. Section 01300 - Submittals.
- C. Section 01600 - Material and Equipment.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.04 REFERENCES

- A. Conform to reference standard by date of issue current on date for receiving bids.
- B. Obtain copies of standards when required by Contract

SECTION 01400 - QUALITY CONTROL

Documents.

- C. Should drawings conflict with these specifications, request clarification from Engineer before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. Submit qualifications of observer to Engineer 7 days in advance of required observations. Observer subject to approval of Engineer.
- B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment and to initiate instructions when necessary.
- C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Submit report in duplicate within 7 days of observation Engineer for review.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01600 - MATERIAL AND HANDLING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control.

1.03 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.04 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

SECTION 01600 - MATERIAL AND HANDLING

- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.06 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.07 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

SECTION 01600 - MATERIAL AND HANDLING

2. Will provide the same warranty for the Substitution as for the specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01650 - STARTING OF SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.
- C. Testing and adjusting.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control.
- B. Section 01700 - Contract Closeout.

1.03 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer and Owner seven days prior to start-up.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of responsible manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01400 that equipment or system has been properly installed and is functioning correctly.

1.04 DEMONSTRATION AND INSTRUCTIONS

SECTION 01650 - STARTING OF SYSTEMS

- A. Demonstrate operation and maintenance of Products to Owner's personnel one week prior to date of final inspection.
- B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment location.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.05 TESTING, ADJUSTING, AND BALANCING

- A. Contractor will perform testing, adjusting and balancing to project requirements, to Engineer's satisfaction.
- B. Reports will be submitted to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Warranties.
- G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

- A. Section 01650 - Starting of Systems.
- B. Section 01730 - Operation and Maintenance Data.

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer and Owner that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to a sanitary condition.

SECTION 01700 - CONTRACT CLOSEOUT

- D. Remove waste and surplus materials, rubbish, and debris from the site.

1.05 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 1. Contract Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other Modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and Modifications.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 3. Field changes of dimension and detail.
 4. Details not on original Contract Drawings.
- F. Submit documents to Engineer with claim for final Application for Payment.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring capacity expansion binders with durable plastic covers as per

SECTION 01700 - CONTRACT CLOSEOUT

Section 01730.

1.08 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
- C. Submit prior to final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01730 - OPERATIONS AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Format and content of manuals.
- B. Instruction of Owner's personnel.
- C. Schedule of submittals.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals.
- B. Section 01400 - Quality Control.
- C. Section 01600 - Material and Equipment.
- D. Section 01700 - Contract Closeout.
- E. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.03 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.04 FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; one inch maximum ring size.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project; identify subject matter of contents.
- D. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- E. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

SECTION 01730 - OPERATIONS AND MAINTENANCE DATA

- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.05 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01400.
- F. Warranties and Bonds: Bind in copy of each.
- G. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- H. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.
- I. Include color coded wiring diagrams as installed.
- J. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any

SECTION 01730 - OPERATIONS AND MAINTENANCE DATA

special operating instructions.

- K. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- L. Provide servicing and lubrication schedule, and list of lubricants required.
- M. Include manufacturer's printed operation and maintenance instructions.
- N. Include sequence of operation by controls manufacturer.
- O. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- P. Provide control diagrams by controls manufacturer as installed.
- Q. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- R. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- S. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- T. Include test and balancing reports as specified in Section 01400.
- U. Additional Requirements: As specified in individual product specification Sections.

1.06 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

SECTION 01730 - OPERATIONS AND MAINTENANCE DATA

- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.09 SUBMITTALS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes in final form 7 days prior to final inspection. Copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
- D. Submit two copies of revised volumes of data in final form within ten days after final inspection.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

DIVISION 2 - DEMOLITION

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL:

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Demolition consists in the removal of one existing steam boiler/burner assembly ("H.B. Smith" 28A Series), vents, piping, fittings, valves, insulation, controls, electrical, etc., as indicated, specified, implied or required.

The Owner shall be responsible for removal of all asbestos content materials or any other hazardous materials found within this facility, prior to starting this demolition work. If asbestos content materials or any other hazardous materials are encountered within this work, this Contractor shall stop work immediately and report to the Engineer and the Owner's representative, as soon as possible.

All rigging work required in connection with the removal of the existing equipment shall be performed in strict coordination with the Owner's representative(s).

Remodeling construction work and patching is included within the respective sections of specifications, including removal of materials for re-use and incorporated into remodeling or new construction.

This Contractor shall be fully responsible for relocation of pipes, conduits, ducts and other mechanical and electrical work in conflict with the existing equipment to be removed, under this Contract.

SUBMITTALS:

Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review prior to commencement of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

JOB CONDITIONS:

Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

Conditions existing at time of commencement of contract will be maintained by Owner insofar as practicable. However, variations within structure may occur

SECTION 02070 - SELECTIVE DEMOLITION

by Owner's removal and salvage operations prior to start of selective demolition work.

Partial Demolition and Removal: Items indicated to be removed but of salvable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to and from occupied portions of building.

Erect temporary covered passageways as required by authorities having jurisdiction.

Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

Protect floors with suitable coverings when necessary.

Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.

Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.

Remove protections at completion of work.

Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

Traffic: 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.

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.

SECTION 02070 - SELECTIVE DEMOLITION

Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operation.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

INSPECTION:

Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

PREPARATION:

Cover and protect furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

DEMOLITION:

Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

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 report to Owner's Representative in written, accurate detail. Pending the receipt of directive from Owner's Representative rearrange selective demolition schedule as necessary to continue overall job progress without delay.

SALVAGE MATERIALS:

Salvage Items: Where indicated on Drawings as "Salvage-Deliver to Owner", carefully remove indicated items, clean, store and turn over to Owner and obtain receipt.

DISPOSAL OF DEMOLISHED MATERIALS:

SECTION 02070 - SELECTIVE DEMOLITION

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

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.

Burning of removed materials is not permitted on project site.

CLEAN-UP AND REPAIR:

Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

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 9 - FINISHES

SECTION 09900 - PAINTING

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Extent of painting work is herein specified.

Work includes field painting of exposed boilers steel supports, exposed bare and covered pipes (including color coding) and exposed hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

"Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Owner will select these from standard colors or finishes available.

Following categories of work are not included as part of field-applied finish work.

Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as finished mechanical and electrical equipment.

Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.

Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting.

Following categories of work are included under other sections of these specifications.

SECTION 09900 - PAINTING

Do not paint over any code-required labels, such as Underwriters' Laboratories or any equipment identification, performance rating, name, or nomenclature plates.

QUALITY ASSURANCE:

Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

SUBMITTALS:

Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

DELIVERY AND STORAGE:

Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

- Name or title of material.
- Fed. Spec. number, if applicable.
- Manufacturer's stock number and date of manufacturer.
- Manufacturer's name.
- Contents by volume, for major pigment and vehicle constituents.
- Thinning instructions.
- Application instructions.
- Color name and number.

Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

JOB CONDITIONS:

Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 deg. F and 90 deg. F, unless otherwise permitted by paint manufacturer's printed instructions.

SECTION 09900 - PAINTING

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS:

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include; but are not limited to, the following:

Manufacturer: Subject to compliance with requirements, provide products of one of the followings:

Devoe and Reynolds Co. (Devoe).
Glidden Coatings and Resins, Division of SCM Corporation (Glidden).
Benjamin Moore and Co. (Moore).
PPG Industries, Pittsburgh Paints (Pittsburgh).
Pratt and Lambert (P & L).
The Sherwin-Williams Company (S-W).

MATERIALS:

Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

PART 3 - EXECUTION

INSPECTION:

Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.

SECTION 09900 - PAINTING

Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

SURFACE PREPARATION:

General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

MATERIALS PREPARATION:

Mix and prepare painting materials in accordance with manufacturer's directions.

Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

APPLICATION:

General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

SECTION 09900 - PAINTING

Provide finish coats which are compatible with prime paints used.

Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.

Sand lightly between each succeeding enamel or varnish coat.

Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and other areas of this facility.

Mechanical items to be painted include, but are not limited to, the following:

Piping, pipe hangers, and supports.

Boilers steel supports.

Accessory items.

Electrical items to be painted include, but are not limited to, the following:

Conduit and fittings.

Plywood backboard for devices mounting.

Prime Coats: Apply prime coat of material which is required to be painted or

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finished, and which has not been prime coated by others.

Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

CLEAN-UP AND PROTECTION:

Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.

Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

EXTERIOR PAINT SCHEDULE:

Aluminum & Steel: Boilers steel supports

High Gloss Alkyd Enamel: 2 Finish coats over primer.

Prime Coat: Zinc Chromate Primer (FS TT-P-645).

Devoc: 13201 Mirrolac Galvanized Metal Primer.

Glidden: Y-5229 - Glid-Guard All-Purpose Metal Primer.

Moore: Iron-Clad Zinc Chromate Primer.

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Pittsburgh: 6-204 PPG Zinc Chromate Primer.
P & L: Noxide Zinc Chromate Primer.
S-W: S-W Zinc Chromate Primer

INTERIOR PAINT SCHEDULE:

General: Provide the following paint systems for the various substrates, as indicated.

Ferrous Metal:

Lusterless (Flat) Finish: 2 Finish Coats over primer, with total dry film thickness not less than 2.5 mils.

Prime Coat: Red Lead Base Primer (FS TT-P-86). Prime coat is not required on items delivered shop primed.

Devco: 41821 Bar-Ox Red Lead Metal Primer.
Glidden: Y-5532 - Glid-Guard Red Lead Metal Primer.
Moore: Iron-Clad Retardo Rust Inhibitive Paint.
Pittsburgh: U610424 Speedhide Red Lead Primer.
P & L: P & L Red Lead Primer.
S-W: S-W Kromik Metal Primer.

First and Second Finish Coats: Interior Flat Latex Base Paint (FS TT-P-29).

Devco: 36XX Wonder-Tones Interior Latex Flat Wall Paint.
Glidden: Y-3400-Line - Spred Satin.
Moore: Moore's Regal Wall Satin.
Pittsburgh: 6-70 Speedhide Latex Flat Wall Paint.
P & L: Pro-Hide Plus Latex Flat Paint.
S-W: S-W Pro-Mar 400 Latex Wall Paint.

Cotton or Canvas Covering over Insulation

Flat Latex Emulsion "Size": 2 Coats.

First and Second Coats: Interior Flat Latex Base Paint (FS TT-P-29). Add fungicidal agent to render fabric mildew-proof.

Devco: 36XX Wonder-Tones Interior Latex Flat Wall Paint.
Glidden: Y-3400-Line - Spred Satin.
Moore: Moore's Regal Wall Satin.
Pittsburgh: 6-70 Speedhide Latex Flat Wall Paint.

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P & L: Pro-Hide Plus Latex Flat Paint.
S-W: S-W Pro-Mar 400 Latex Wall Paint.

END OF SECTION

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DIVISION 15 - MECHANICAL

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, 3 & 9 Specification sections, apply to work of this section.

Related Sections: Division 16 - Special and specific electrical requirements are specified within each respective equipment specification section.

SUMMARY:

This section specifies: the basic requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in sections of Division 1.

ACCESSIBILITY:

Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

ROUGH-IN:

Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

QUALITY ASSURANCE:

Codes and Standards: All work shall comply with the 2005 Connecticut State Building and Fire Codes, including 2016 Connecticut State Building & Fire Safety Codes, 2012 International Building Code, 2012 International Mechanical Code, 2012 International Plumbing Code, 2012 International Energy Conservation Code, 2014 National Electrical Code, and 2009 ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities; and other codes, regulations, ordinances, etc., which may apply including the requirements of local authorities having jurisdiction and utility companies. Nothing on the drawings or in the specifications shall be interpreted as an infringement of such codes and regulations.

MECHANICAL INSTALLATION:

Coordinate mechanical equipment and materials installation with other building components.

Verify all dimensions by field measurements.

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

Arrange for slots and openings in other building components to allow for mechanical installations.

Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

Coordinate connection of mechanical systems with exterior underground services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

CUTTING AND PATCHING:

This article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

Refer to the Division 1, Section 01045.

Do not endanger or damage installed Work through procedures and processes of cutting and patching.

Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

Perform cutting, fitting, and patching of mechanical equipment and materials required to:

uncover Work to provide for installation of ill-timed Work;

remove and replace defective Work;

remove and replace Work not conforming to requirements of the Contract Documents;

install equipment and materials in existing structures;

upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping and other mechanical items made obsolete by the new Work.

MECHANICAL SUBMITTALS:

Refer to the Conditions of the Contract (General and Supplementary) and Division 1, Section 01300.

Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Engineer will not be processed.

Provide certified Structural Engineer shop drawings for seismic restraints, as required to anchor equipment to concrete pads, such as hot water heating boilers/burners assemblies, domestic hot water system.

Provide seismic restraints shop drawings for piping in compliance with 2012 International Building Code, Section 1613, and as indicated SMACNA - Seismic Restraint Manual Guidelines for Mechanical Systems - First Edition 1991. The following chapters will apply:

- 1 - Chapter 4 - Detail Drawings of Bracing.
- 2 - Chapter 7 - Sizing Tables for SHL C.
- 3 - Chapter 8 - Details of Connections.
- 4 - Chapter 9 - Miscellaneous Connections.

DELIVERY, STORAGE AND HANDLING:

Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

RECORD DOCUMENTS:

Mark Drawings to indicate revisions to piping, size and location equipment and piping, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance.

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

Mark Specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

WARRANTIES:

Compile and assemble the warranties specified in Division 15, as required by Division 1, Section 01700.

CLEANING:

Refer to the Division 1, Section 01700.

END OF SECTION

SECTION 15055 - DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Furnish all necessary labor and equipment required to remove and safely dispose all items shown on drawings, specified below, implied or required by this project.

1.02 RELATED WORK

A. Section 15010: Basic Mechanical Requirements

1.03 QUALITY ASSURANCE

- A. All demolition work and removal shall conform to local, state and national codes and regulations which may apply and nothing in these specifications shall be interpreted as an infringement of such codes and regulations.

1.04 SUBMITTALS

- A. Submit for review a schedule of all demolition work and proposed methods of disposal.

PART 2 PRODUCTS

(NOT APPLICABLE)

PART 3 EXECUTION

- 3.01 Remove all mechanical work within the contract area and as noted on plans, specified hereby, implied or required. All other unusable equipment shall be removed and properly disposed or as directed by the Owner's representative. All piping & vent directly connected to the boiler/burner assembly shall be temporarily removed as indicated, shown, directed, implied, required or scheduled. Refer to Section 01010 - Summary of Work, for further details.
- 3.02 Relocate existing piping or devices conflicting with new equipment, devices, ductwork, etc.
- 3.03 All existing abandoned or disused mechanical work within contract area shall be removed completely back to the last active device, regardless of the location of said device.
- 3.04 All active items within the contract area which service the contract area and beyond the contract area shall be maintained in service.

SECTION 15055 - DEMOLITION

- 3.05 Remove and relocate all existing mechanical work as necessary for coordination with the work of other trades.
- 3.06 All exposed piping and accessories shall be completely removed including hangers, fittings, etc.
- Disused piping embedded in the building structure shall be stubbed off as close to the structure as practicable.
- 3.07 All removed equipment shall become the Contractors' property unless otherwise noted and/or specified, and shall be removed from the premises in entirety and safely disposed of in accordance with all local, state and federal regulations.
- 3.08 Contractor shall pay for all disposal costs incurred in conjunction with the work.

END OF SECTION

SECTION 15121 - PIPING EXPANSION COMPENSATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED SECTIONS

- A. Section 15510 - Hydronic Piping.
- B. Section 15520 - Steam and Steam Condensate Piping.

1.03 REFERENCES

- A. MIL-E-17814E - Expansion Joints, Pipe, Slip-Type, Packed.

1.04 PERFORMANCE REQUIREMENTS

- A. Provide structural work and equipment required to control expansion and contraction of piping. Verify that anchors, guides, and expansion joints provided, adequately protect system.
- B. Expansion Calculations:
 - 1. Installation Temperature: 50 degrees F.
 - 2. Steam Heating Piping: 220 degrees F.
 - 3. Safety Factory: 30 percent.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate selection calculations.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and external controls.

1.06 PROJECT RECORD DOCUMENTS

SECTION 15121 - PIPING EXPANSION COMPENSATION

2. Exterior Sleeve: Braided bronze.
3. Pressure Rating: 125 psig WSP and 450 degrees F and 70 degrees F.
4. Joint: As specified for pipe joints.
5. Size: Use pipe sized units.
6. Maximum offset: 3/4 inch on each side of installed center line.

2.02 EXPANSION JOINTS

- A. Stainless Steel Bellows Type:
 2. Pressure Rating: 125 psig WSP and 400 degrees F.
 3. Maximum Compression: 3 inch.
 4. Maximum Extension: 1/4 inch.
 5. Joint: As specified for pipe joints.
 6. Size: Use pipe sized units.
 7. Application: Steel piping 3 inch and under.

2.03 ACCESSORIES

- A. Pipe Alignment Guides
 1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Construct spool pieces to exact size of flexible connection for future insertion.
- C. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Rigidly anchor pipe to building structure where necessary. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Provide expansion loops, as required.

SECTION 15121 - PIPING EXPANSION COMPENSATION

END OF SECTION

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SECTION 15140 - SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Sleeves and seals.

1.02 RELATED SECTIONS

- A. Section 15010 - Basic Mechanical Requirements.
- B. Section 15410 - Plumbing Piping.
- C. Section 15484 - Natural Gas & Fuel Oil Piping and Specialties.
- D. Section 15450 - Plumbing Equipment.
- E. Section 15510 - Hydronic Piping.
- F. Section 15515 - Hydronic Specialties.
- G. Section 15520 - Steam and Steam Condensate Piping.
- H. Section 15525 - Steam and Steam Condensate Piping Specialties.
- I. Section 15561 - Water-Tube Boilers.

1.03 REFERENCES

- A. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- B. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- C. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- D. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturers catalog data including load capacity.

SECTION 15140 - SUPPORTS AND ANCHORS

- C. Provide certified Structural Engineer shop drawings for seismic anchoring details for equipment, as boilers/burner unit, etc., as indicated and required.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable State of Connecticut code for support of piping. Conform to SMACNA - Seismic Restraint Manual Guidelines for Mechanical Systems - First Edition 1991.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Manufacturers:

1. Grinell Corp.
2. Other acceptable manufacturers offering equivalent products.
 - a) B Line Systems, Inc.
 - b) Master Fit Co.
 - c) Piping Technology & Products, Inc.

B. Steam & Steam Condensate, Hydronic Piping and Cold Water Make-up:

1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook
7. Vertical Support: Steel riser clamp.
8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Floor Support for Hot Pipe Sizes to 4 Inches: cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Natural Gas and Fuel Oil Piping

1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69, and MSS SP89.

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2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon Steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 to 4 Inches: Carbon Steel, adjustable clevis.
4. Wall Support: Cast iron hook.
5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and steel support.

2.02 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.03 SLEEVES

A. Manufacturers:

1. B & K Industries, Inc.
2. Other acceptable manufacturers offering equal products.
 - a) Piping Technology & Products
 - b) Dresser Industries, Inc.
 - c) Victaulic Co. of America.

- B. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage galvanized steel.

- C. Sleeves for Pipes Through Non-fire Rated Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage galvanized steel.

- D. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

- E. Firestopping Insulation: Glass fiber type, non-combustible.

- F. Sealant: Acrylic.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02 INSERTS

- A. Provide inserts for placement in concrete formwork.

SECTION 15140 - SUPPORTS AND ANCHORS

- B. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.03 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.
- G. Provide copper plated hangers and supports for copper piping.
- H. Design hangers for pipe movement without disengagement of supported pipe.
- I. Prime coat exposed steel hangers and supports. Hangers and supports located in pipe shafts, are not considered exposed.

3.04 EQUIPMENT BASES AND SUPPORTS

- A. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- B. Construct supports of steel members. Brace and fasten with flanges bolted to structure, as required for seismic Zone # 2.
- C. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floor one inch above finished floor level. Calk sleeves.
- D. Where piping penetrates walls, close space between pipe and adjacent work

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with fire stopping insulation and calk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.06 SCHEDULES

PIPE SIZE Inches	MAX. HANGER SPACING Feet	HANGER ROD DIAMETER Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8

END OF SECTION

SECTION 15160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR MECHANICAL EQUIPMENT

PART 1 GENERAL

1.1 DESCRIPTION

- A. It is the intend of this specification to provide the basis of seismic design for every mechanical system, including piping and ductwork within the building. Provide seismic restraints, complete, as shown, specified or required.
- B. Seismic isolation in this section replaces standard isolation systems.
- C. The work of this section includes, but is not limited to the following:
 - 1. Piping flexible connections.
 - 2. Seismic restraints for isolated piping, and equipment.
 - 3. Seismic restraints for isolated and non-isolated piping, equipment, ductwork, tanks, etc. (see non-isolated equipment list).
- D. Work related with other sections:
 - 1. All floor or ceiling mounted equipment, piping specified for project.

1.2 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced.
 - 1. Federal Specification (Fed. Spec.)
 - RR-W-410d Wire Rope and Strand
 - 2. American National Standards Institute, Inc. (ANSI) Standards:
 - B18.2.1-1981 Square and Hex Bolts and Screws
Inch Series
 - B18.2.2-1972 Square and Hex Nuts
- B. American Society for Testing and Materials (ASTM) Publications:
 - A 36-84a Structural Steel

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SECTION 15160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR MECHANICAL EQUIPMENT

- A 307-84 Carbon Steel Externally Threaded Standard Fasteners
- A 325-85 High-Strength Bolts for Structural Steel Joints
- A 501-84 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
- A 576-81 Steel Bars, Carbon, Hot-Wrought, Special Quality
- E 580-78 Application of Ceiling Suspension Systems for Acoustical Lay-In Panels

C. National Fire Protection Association (NFPA) Standard:

13-2002 Installation of Sprinkler Systems

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data:

1. Catalog cuts and data sheets on specific vibration isolators and restraints to be utilized, showing compliance with the specifications.
2. An itemized list showing the items of equipment or piping to be isolated, the isolator type or model number selected, isolator loading and deflection, and reference to specific drawings showing base and construction, where applicable.
3. An itemized list of equipment, piping, and ductwork not isolated to be seismically restrained.
4. Structural Engineer stamp verifying design and calculations for seismic restraining system used.

C. Shop Drawings

1. Drawings showing methods of suspension, support guides for piping and equipment.
2. Drawings showing methods for isolation of pipe piercing walls and slabs.
3. Concrete and steel details for bases including anchor bolt

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locations.

4. Number and location of seismic restraints and anchors for each piece of equipment.
5. Specific details of restraints including anchor bolts for mounting and maximum loading at each location, for each piece of equipment and or pipe and duct locations.

1.4 CODE AND STANDARD REQUIREMENTS

- A. 2012 International Building Code - Section 1613 and Practical Guide to Seismic Restraints - ASHRAE 1999.

1.5 MANUFACTURER RESPONSIBILITIES

- A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:
 1. Determine vibration isolation systems and seismic restraints locations.
 2. Provide piping isolation and equipment isolation systems and seismic restraint as required.
 3. Guarantee specified isolation system deflection.
 4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.
 5. Purchased and/or fabricated equipment must be designed to safely accept external forces of one-half "G" load in any direction for all rigidly and resiliently supported equipment, piping and ductwork without failure and permanent displacement of the equipment. Substitutions of "Internally Isolated" mechanical equipment in lieu of the specified isolation of this Section must be approved for individual equipment units and is acceptable only if above accelerations are certified in writing by equipment manufacturer and stamped by a licensed structural engineer.

1.6 QUALITY ASSURANCE

- A. It is the objective of this Specification to provide the necessary design for the control of excessive noise and vibration in the Buildings due to the operation of machinery or equipment, and/or due to interconnected piping. The associated hangers and bases, shall be under the direct supervision of the vibration isolation manufacturer's representative.

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1. All vibration isolators shall have either known non-deflected heights or calibration markings, so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
2. All isolators shall operate in the linear portion of their loads versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer, and must be linear over a deflection range of not less than 50% above the design deflection.
3. The theoretical vertical natural frequency for each support point, based upon load per isolator and isolator stiffness, shall not differ from the design objectives for the equipment as a whole by more than +/- 10%.
4. All neoprene mountings shall have a Shore hardness of 30 to 60 +/- 5, after minimum aging of 20 days or corresponding oven-aging.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. All vibration isolation and seismic devices shall be the product of a single manufacturer. Products of other manufacturers are acceptable provided their systems strictly comply with the design intent, performance, deflection and structural design of base manufacturer.

2.2 QUALIFICATIONS

- A. Only firms having 10 year experience designing and manufacturing seismic devices shall be capable of work in this specification. Vibration control seismic manufacturer shall submit project listing to this effect.

2.3 MATERIALS AND EQUIPMENT shall conform to the respective specifications and other requirements specified below:

2.3.1 Bolts and Nuts

- A. Square head bolts and heavy hexagon nuts, ANSI B18.2.1 and B18.2.2, and ASTM A 307 or A 576. Underground bolts ASTM A 325.
- B. All rigidly mounted equipment will have a minimum of four anchor bolts securely fastened through bases. Anchor bolts must conform to

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ASTM A 307.

Anchor bolts that exceed normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths.

When height-to width ratio of the equipment exceeds 8.9, overturning must be investigated. Expansion anchors shall not be used to resist seismic or vibratory loads unless test data are provided to verify the adequacy of the specific anchor and application. In no case shall the expansion anchor size be less than that required for bolts in the preceding table.

2.3.2 Sway Braces: Material used shall be ASTM A36 for structural members and ASTM A 501 for steel piping.

2.3.3 Flexible couplings: Flexible couplings shall have same pressure rating as adjoining pipe.

A. Flexible ball joints conforming to the following requirements may be employed on aboveground piping. Joints shall cast or wrought steel casing and ball parts capable of 360-degree rotation plus not less than 15-degree angular movement. Joints shall be certified to be suitable for service intended by the manufacturer, based on less than 2 years' satisfactory operation in a similar application.

B. Flexible couplings and joints of the mechanical joint type may be used for above ground piping. Mechanical couplings for steel pipe shall be sleeve type and shall provide a tight flexible joint under all reasonable conditions, such as pipe movement caused by expansion & contraction. Where permitted in other sections of these specifications, joints utilizing split-half couplings with grooved or shouldered pipe ends may be used. Sleeve-type couplings shall be used for joining plain-end pipe sections. The couplings shall consist of one steel middle ring, two steel followers, two gaskets, and necessary steel bolts and nuts to compress the gaskets.

2.3.4 Seismic Restraints Types

A. General

1. Shall be capable of safely accepting one-half "G" external forces without failure, or one "G" for life safety equipment. Shall maintain equipment, piping, in a captive position. Shall not short circuit vibration isolation systems or transmit objectionable noise. Shall be provided on all equipment as specified. Calculations by registered Structural Engineer shall be submitted

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to verify snubber capacities for each isolated piece of equipment.

- a. Spring Seismic Restraint, Type I: Shall comply with general characteristics of spring isolators having a minimum O.D. to O.H. of .8 to 1 and minimum run out of 50% to solid. Shall incorporate snubbing restraint in all directions. Shall be capable of supporting equipment at a fixed elevation during equipment erection. Cast or aluminum housings unless ductile iron are not acceptable. System to be field bolted or welded to deck with 1 G acceleration capability.

"Mason Industries", type SSLFH or equivalent.

- b. Seismic Restraint, Type II: Each corner or side shall incorporate a seismic restraint having a minimum 5/8" thick resilient pad limit stops working in all directions. Restraints shall be made of plate, structural members or square metal tubing concentric within a welded assembly incorporated resilient pads. Angle bumpers are not acceptable. System to be field bolted or welded to deck with 1 G acceleration capability.

"Mason Industries", Type Z-1011 and Z-1225 or equivalent.

- c. Seismic Restraint, Type III: Metal cable type with approved end fastening devices to equipment and structure. System to be field bolted to deck or overhead structural members using two sided beam clams to steel or appropriately designed inserts for concrete. All parts of system including cables, clams, excluding fastenings are to be single vendor furnished to assure seismic compliance.

"Mason Industries", Type SCB or equivalent.

- d. Seismic Restraint, Type IV: Double deflection neoprene isolator encased in ductile iron or steel casing minimum .30 static deflection. System to be field bolted or welded to deck with 1 G acceleration capability.

- e. Seismic Restraint, Type V: Non-isolated equipment to be field bolted or welded (powder shots not acceptable) to resist seismic forces under 100# shear force required.

B. Vibration Isolator Types:

1. Type A: Spring isolators shall incorporate the following:

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- a. Minimum diameter of 0.8 of the loaded operating height.
- b. Corrosion resistance where exposed to corrosive environment with:
 1. Spring cadmium plated or electro-galvanized.
 2. Hardware cadmium plated.
 3. All other metal parts hot-dip galvanized.
- c. Reserve deflection (from loaded to solid height) of 50% of rated deflection.
- d. Minimum 1/4" thick neoprene acoustical base pad on underside, unless designated otherwise.
- e. Designed and installed so that ends of springs remain parallel and all springs installed with adjustment bolts.
- f. Non-resonant with equipment forcing frequencies or support structure natural frequencies.

"Mason Industries", Type SLF or equivalent.

Note: This isolator must be accompanied by seismic isolator Type II.

2. Type B: Spring isolators shall be same as Type A, except:
 - a. Provide built-in vertical limit stops with minimum 1/4" clearance under normal operation.
 - b. Trapped holes in top plate for bolting to equipment when subject to wind load.
 - c. Capable of supporting equipment at a fixed elevation during equipment erection. Installed and operating heights shall be identical.
 - d. Adjustable and removable spring pack with separate neoprene pad isolation.
 - e. Housing to be designed to accept 1 G of acceleration.
 - f. Requires bolting on welding to meet acceleration criteria.

"Mason Industries", Type SLR or equivalent.

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3. Type C: Spring hanger rod isolators shall incorporate the following:
 - a. Spring element seated on a steel washer within a neoprene cup incorporating a rod isolation bushing.
 - b. Steel retainer box encasing the spring and neoprene cup.
 - c. Requires seismic restraint Type III.

"Mason Industries", Type HS or equivalent.
4. Type D: Seismic Restraint, Type IV: Double deflection neoprene isolator encased in ductile iron or steel casing minimum .30 static deflection. System to be field bolted or welded to deck with 1 G acceleration capacity.

"Mason Industries", Type BR, RBA or equivalent.
5. Type E: Elastomer hanger rod isolators shall incorporate the following:
 - a. Molded unit type neoprene element with projecting bushing lining rod clearance hole.
 - b. Neoprene element to be minimum 1-3/4" thick.
 - c. Steel retainer box encasing neoprene mounting.
 - d. Clearance between mounting hanger rod and neoprene bushing shall be minimum of 1/8".
 - e. Minimum static deflection of 0.35".
 - f. Requires seismic restraint Type III.

"Mason Industries", Type HD or equivalent.
6. Type F: Combination spring/elastomer hanger rod isolators shall incorporate the following:
 - a. Spring and neoprene isolator elements in a steel box retainer. Neoprene of double deflection type. Single, deflection is unacceptable. Spring seated in a neoprene cup with extended rod bushing.

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b. Characteristics of spring and neoprene as described Type A and type E isolators.

c. Requires seismic restraint Type III

"Mason Industries", Type DNHS or equivalent.

7. Type C: Pad type elastomer mountings to incorporate the following:

a. 0.75" minimum thickness.

b. 50 psi maximum loading.

c. Ribbed or waffled design.

d. .10" deflection per pad thickness.

e. 1/16" galvanized steel plate between multiple layers or pad thickness.

f. Suitable bearing plate to distribute load.

"Mason Industries", Type Super W or equivalent.

8. Type H: Pad type elastomer mountings to incorporate the following:

a. Laminate canvas duck and neoprene.

b. Maximum loading 1000 psi.

c. Suitable bearing plate to distribute load.

d. Minimum thickness, 1/2".

"Mason Industries", Type HL or equivalent.

9. Type I: Isolated Clevis:

Vibration isolation manufacturer shall provide an isolated clevis hanger for pipe support that combines a unit clevis or rod roller hanger and a Type (C,E or F) isolation hanger into one assembly. System shall be pre-compressed to allow for rod insertion and standard leveling. Deflections and type shall be as listed in section 3.03.

a. Requires seismic restraint Type III.

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"Mason Industries", Type CIH or equivalent.

10. Type K: Pipe Anchors:

Vibration isolator manufacturer shall provide an all directional acoustical pipe anchor, consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum half inch thickness of heavy duty neoprene isolation material. Vertical restraints shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material shall not exceed 500 psi and the design shall be balanced for equal resistance in any direction. Isolation to be bolted or welded depending on structure.

"Mason Industries", Type ADA or equivalent.

2.4 EQUIPMENT BASES

A. Isolated Rail Base, Type B-5

1. Rails shall be constructed from structural steel angles as required to prevent flexure and misalignment under load.
2. Each rail shall be the full length of the supported equipment and be welded to a series of vertically restraint spring isolators as Type B described above.
3. Angles shall have bolt together ties at the ends and center to form one rigid base platform.
4. System to be bolted or welded to deck.
5. System to be designed for minimum 1 G of acceleration.

"Mason Industries", Type TRSLR or equivalent.

2.5 FLEXIBLE CONNECTORS

A. Elastomer Type FC-1

1. Manufactured of nylon tire and EPDM, both molded and cured with hydraulic presses.
2. Straight connectors to have two spheres reinforced with molded-in external ductile iron ring between spheres.
3. Elbow shall be long radius reducing type.

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4. Rated 250 psi at 170 degrees F. Dropping in a straight line to 170 psi at 250 degrees F for sizes 1-1/2" to 12" elbows. Elbows shall be rated no less than 90% of straight connections.
5. Sizes 10" and 12" to employ control cables with neoprene end fittings isolated from anchor plates by means of 1/2" bridge bearing neoprene bushings.
6. Minimum safety factor, 4 to 1 at maximum pressure ratings.
7. System bolted to Victaulic type couplings or gate, butterfly or check valves to have a minimum 5/8" flange spacer installed between connector and coupling on flange.
8. Submittals to include test reports.

"Mason Industries", Type MFTNC Superflex or equivalent.

B. Flexible Stainless Steel Hose, Type FC-2

1. Braided flexible metal hose.
2. 2" pipe size and smaller with male nipple fittings.
3. 2-1/2" and larger pipe size with fixed steel flanges.
4. Suitable for operating pressure with 4:1 minimum safety factor.
5. Length as recommended by equipment manufacturer.

"Mason Industries", Type BSS or equivalent.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stresses or misalignment.
- B. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as specified and required.
- C. All piping 2" and over located in mechanical equipment rooms and duct runs from connected equipment for 50 feet, shall be isolated - see 3.03.

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- D. All HVAC piping and vertical risers shall be isolated from the building structure by means of noise and vibration isolation guides and supports.
- D. Each fan motor and motor assembly shall be supported on a single structural steel frame. Flexible duct connections shall be provided at inlet and discharge ducts.
- F. All equipment whether isolated or not shall be bolted to structure to allow for minimum 1/2 G of acceleration. Bolt points and diameter of inserts shall be submitted for each piece of equipment and certified by a licensed Structural Engineer.
- G. All structurally suspended overhead equipment isolated or non-isolated shall be four point independently braced with Type III seismic restraining system.
- H. Install seismic restraining system Type III: taught for overhead suspended non-isolated equipment, piping or ductwork and slack with 1/2" cable deflection for isolated systems.
- I. Seismically restrain all piping and ductwork with Type III restraining system in accordance with guidelines as outlined below.
 - 1. Piping, schedule 10,20, or 40 weld or victaulic braced at 40 feet intervals and at turns not more than 4 feet. Lateral bracing 80 intervals.
 - 2. Ductwork to be braced every 30 feet and at every turn and duct run ends. Lateral bracing every 60 feet.
- J. If equipment is mounted on housekeeping pads, pads to be properly doweled or expansion shielded to deck to meet acceleration criteria.
- K. Seismic restraints are not required for the following:
 - 1. Fuel gas and oil piping, medical gas piping and compressed air piping 1" and smaller.
 - 2. Piping in Boiler Rooms, Mechanical Equipment Rooms and Refrigeration Machinery Rooms less than 1-1/4" I.D.
 - 3. Other piping less than 2-1/2" I.D. will be braced same as piping larger than 2-1/2 " I.D.
 - 4. All rectangular ducts less than 6 sqft in cross sectional area and round ducts 28" in diameter an larger.

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5. All clevis piping suspended by individual hangers 12" in length or less from top of the pipe to the bottom of the support for the hanger. Fire protection mains decrease to 6".
6. All top supported ducts suspended by hangers 12" or less in length from the top of the duct to the bottom of the support for the hanger.
- L. Where base anchoring is insufficient to resist seismic forces supplementary restraining such as seismic restraint system Type III shall be used above systems center of gravity to suitably resist "G" force levels. Vertically mounted tanks may require this additional restraint.
- M. For overhead supported equipment, overstress of the building structure must not occur. Bracing can occur from:
 1. Flanges of structural beams.
 2. Upper and lower truss chords in bar joist construction at the panel points.
 3. Cast in place inserts or drilled and shielded inserts in concrete structures.
- N. Pipe risers through cored shafts require no further seismic bracing. (Core diameter to be maximum 2" larger than pipe O.D.).

3.2 EQUIPMENT INSTALLATIONS

- A. Place floor mounted equipment on 4" high concrete housekeeping pads properly doweled or expansion shielded to deck to meet acceleration criteria. Mount vibration isolating devices and related inertia blocks on concrete pad. Concrete work specified in Division 3.
- B. Additional Requirements
 1. The minimum operation clearance between the equipment frame or rigid steel base and the housekeeping pad or floor shall be 1". Minimum operating clearance between concrete inertia and base and housekeeping pad or floor shall be 2".
 2. The equipment structural steel or concrete inertia base shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the machine or isolators.
 3. The isolators shall be installed without raising the machine and frame assembly.

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4. After the entire installation is complete and under full operational load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators. When all isolators are properly adjusted, the blocks or shims shall be barely free and shall be removed.
5. Isolation mounting deflection shall be (minimum) as specified.
6. Install equipment with flexibility in wiring connection.
7. Verify that all installed isolator and mounting systems permit equipment motion in all directions. Adjust or provide additional resilient restraints to limit start-up equipment lateral motion to 1/4".
8. Prior to start-up, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base, isolators or seismic restraints.

C. Seismic selection for non-isolated equipment

1. Mechanical equipment, HVAC
 - a. All ceiling suspended piping and ductwork not excluded by diameter or distance requirement from support.

Seismic Restraint, Type III.
 - b. All ceiling mounted equipment including but not limited to cabinet unit heaters.

Seismic Restraint, Type III.
 - c. All floor mounted equipment.

Seismic restraint, Type V.

3.3 PIPING ISOLATORS

- A. All piping, except fire standpipe systems, are included in this Section.

B. Installation:

1. Isolate piping outside shafts as follows:

All water piping in Boiler Room. Water piping and boiler breaching

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within 50 feet (or 100 diameters if greater than 50 feet) from connected rotating equipment.

2. The isolators shall be installed with the isolator hanger box attached to, or hung as close possible to, the structure.
3. The isolators shall be suspended from substantial structural members, not from slab diaphragm unless specifically permitted.
4. Hanger rods shall be aligned to clear the hanger box.
5. Horizontal suspended pipe 2" and smaller shall be suspended by Type E isolator with a minimum 3/8" deflection. Water pipe larger than 2" shall be supported by Type F isolator with minimum 1" or same static deflection as isolated equipment to which pipe connects, whichever is greater. Screwed piping (I.P.S.) or flanged piping shall be supported at approximately 10 foot intervals. Copper tubing shall be supported at approximately 6 foot intervals for tubing 1-1/2" and smaller in diameter and 10 foot intervals for tubing 2" and larger in diameter.

Transverse bracing at 40'-0" o.c. maximum unless otherwise noted. Longitudinal bracings at 80'-0" o.c. maximum unless otherwise noted. When thermal expansion or contraction is involved, provide longitudinal bracings at anchor points. The longitudinal braces at connections must be capable resisting the force induced by expansion and contraction. Transverse bracing for one pipe section may also act as longitudinal bracing for the pipe section perpendicular to it, if the bracing is installed within 24" of the elbow or tee of similar size. For threaded piping the flexibility may be provided by the installation of swing joints. In welded or solder joint piping the flexibility shall be provided by expansion loops or manufactured flexible connectors. For piping with manufactured ball joints, select length of piping offset using "seismic drift" in place of "Expansion per joint manufacturer's" selection table. Seismic drift = 0.015 ft per foot of height.

- 5a. Type CIH hanger can substitute for the above.
6. Horizontal pipe floor supported at slab shall be supported via Type A, with a minimum static deflection of 1" or same deflection as isolated equipment to which pipe connects, whichever is greater.
7. Vertical riser pipe supports under 2" diameter shall utilize Type H. Screwed piping (I.P.S.) shall be supported at not less than every other story height. Copper tubing shall be supported at each story for piping 1-1/2" and larger diameter, and not more than 6 foot intervals for piping 1-1/2" and smaller diameter. Piping of other

SECTION 15160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR MECHANICAL EQUIPMENT

materials shall be supported in accordance with their approved installation standards.

8. Vertical riser guides where required, shall avoid direct contact of piping with building.
9. Pipe anchors, or guides where required, shall utilize resilient pipe anchors, to avoid direct contact of piping with building.

"Mason Industries", Type ADA or equivalent.

10. Pipe sway braces, where required, shall utilize two (2) neoprene elements (Type G or H to accommodate tension and compression forces).
11. Pipe extension and alignment connectors: Provide connectors at riser takeoffs, cooling and heating coils, and elsewhere as required, to accommodate thermal expansion and misalignment.
12. Do not use branch lines to brace main lines. Trapeze hangers may be used.
13. Provide flexibility in joints where pipes pass through building seismic or expansion joints, or where rigidly supported pipes connect to equipment with vibration isolators.
14. A rigid piping system shall not be braced to dissimilar parts of building, or two dissimilar building systems that may respond in a different mode during an earthquake. Example: wall and roof - solid concrete wall and metal deck with lightweight concrete fill.

C. Isolator Position

1. Close to building structure.
2. Between building structure and supplementary steel, if required.
3. Suspend isolators from rigid and massive support points.
4. Supplementary steel to be sized for a maximum deflection 0.08 inches at center span.
5. Support water piping in shafts and floor supports entering shaft with Type G isolators or type H pad to prevent direct contact of piping with building structure.

3.4 INSPECTION

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- A. On completion of installation of all vibration isolation devices herein specified, the local manufacturer's representative shall inspect the complete system and report in writing any installation error, improperly elected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Engineer, including the manufacturer's representatives final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

3.5 SELECTION

- A. For boiler use isolation type B with .4" deflection. Boilers shall be allowed to expand & contract freely, but movement beyond this limits shall be restraint.

Also, the movement produced by an overturning moment shall be restrained, as required.

END OF SECTION

SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.

1.02 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 NAMEPLATES

- A. Manufacturers:
 - 1. Seton Name Plate Co.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a) Brady USA Inc.
 - b) Almetek Industries, Inc.
 - c) Preferred Utilities Mfg Co.
- B. Description: Laminated three-layer plastic with engraved

SECTION 15190 - MECHANICAL IDENTIFICATION

black letters on light contrasting background color.

2.02 TAGS

- A. Manufacturers:
 - 1. Same as above.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 diameter.
- C. Chart: Typewritten letter size list in anodized aluminum frame.

2.03 PIPE MARKERS

- A. Manufacturers:
 - 1. Same as above.
- B. Color: Conform to ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces for stencil painting.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

SECTION 15190 - MECHANICAL IDENTIFICATION

- E. Identify all new equipment in the Boiler Room with nameplates, as: boiler/burner unit, etc.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Tag automatic controls, instruments, and relays. Key to control schematic.
- I. Identify exposed piping with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction.

END OF SECTION

SECTION 15260 - PIPING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15140 - Supports and Anchors: Placement of hangers and hanger inserts.

1.03 RELATED SECTIONS

- A. Section 15190 - Mechanical Identification.

1.04 REFERENCES

- A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
- D. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- E. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- F. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- G. ASTM C585 - Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
- H. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- I. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.
- J. ASTM E84 - Surface Burning Characteristics of Building Materials.
- K. ASTM E96 - Water Vapor Transmission of Materials.
- L. NFPA 255 - Surface Burning Characteristics of Building Materials.
- M. UL 723 - Surface Burning Characteristics of Building Materials.

SECTION 15260 - PIPING INSULATION

N. 2012 International Energy Conservation Code (IECC).

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

D. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA255 and UL 723.

1.07 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three year experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic.

D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

C. The insulation thickness must equal or exceed the requirements outlined in the 2012 International Energy Conservation Code (IECC), Table 503.2.8.

PART 2 PRODUCTS

SECTION 15260 - PIPING INSULATION

2.01 GLASS FIBER

- A. Manufacturers:
 - 1. Owens Corning Fiberglass, Mfg. Co.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a) Manville/Schuller
 - b) Knauf Fiberglass GmbH
 - c) Certain Teed Corp.

- B. Insulation: ASTM C547; rigid molded, noncombustible.
 - 1. 'K' value : ASTM C335, 0.24 at 75 degrees F.
 - 2. Minimum Service Temperature: -20 degrees F.
 - 3. Maximum Service Temperature: 300
 - 4. Maximum Moisture Absorption: 0.2 percent by volume.

- C. Vapor Barrier Jacket
 - 1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
 - 3. Secure with self sealing longitudinal laps and butt strips.
 - 4. Secure with outward clinch expanding staples and vapor barrier mastic.

- D. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.

- E. Vapor Barrier Lap Adhesive
 - 1. Manufacturers:
 - a) Armstrong World Industries
 - b) Arrow Adhesives Co.
 - c) 3M.
 - 2. Compatible with insulation.

- F. Fibrous Glass Fabric
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
 - 2. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.

- G. Indoor Vapor Barrier Finish
 - 1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.02 JACKETS

- A. PVC Plastic
 - 1. Manufacturers:
 - a) Manville/Schuller.
 - b) Zeston.
 - c) Vimasco Co.

SECTION 15260 - PIPING INSULATION

2. Jacket: ASTM C921, One piece molded type fitting covers and sheet material, off white color.
 - a) Minimum Service Temperature: -40 degrees F.
 - b) Maximum Service Temperature: 150 degrees F.
 - c) Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
 - d) Maximum Flame Spread: ASTM E84; 25.
 - e) Maximum Smoke Developed: ASTM E84; 50.
 - f) Thickness: 10 mil.
 - g) Connections: Pressure sensitive color matching vinyl tape.
3. Covering Adhesive Mastic
 - a) Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory applied or field applied.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
 3. Finish with glass cloth and vapor barrier adhesive.
 4. PVC fitting covers may be used.
 5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
 6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- D. For insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
 3. Finish with glass cloth and adhesive.
 4. PVC fitting covers may be used.
 5. For hot piping conveying fluids 140 degrees F or less, do not

SECTION 15260 - PIPING INSULATION

insulate flanges and unions at equipment, but bevel and seal ends of insulation.

6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

E. Inserts and Shields:

1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert Location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: ASTM C640 cork or other heavy density insulating material suitable for the planned temperature range.

F. Finish insulation at supports, protrusions, and interruptions.

- G. For pipe exposed in mechanical equipment rooms or in finished spaces above finished floor finish with PVC jacket and fitting covers.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEMS	PIPE SIZE	THICKNESS
	Inch	Inch
A. Low Pressure Steam	Up to 1-1/2"	1-1/2"
	Above 1-1/2"	3"
B. Heating Hot Water	Up to 1-1/2"	1-1/2"
	Above 1-1/2"	2"
C. Domestic Hot Water	Up to 2"	1"
	Above 2"	1-1/2"
D. Cold water make-up	All sizes	1"

END OF SECTION

SECTION 15280 - EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment insulation.
- B. Covering.

1.02 RELATED SECTIONS

- A. Section 09900 - Painting: Painting insulation covering.
- B. Section 15190 - Mechanical Identification.
- C. Section 15575 - Breeching: Breeching insulation

1.03 REFERENCES

- A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- D. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
- E. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- F. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- G. ASTM C533 - Calcium Silicate Block and Pipe Thermal Insulation.
- H. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- I. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- J. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- K. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- L. ASTM C640 - Corkboard and Cork Pipe Thermal Insulation.
- M. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- N. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

SECTION 15280 - EQUIPMENT INSULATION

- O. ASTM E84 - Surface Burning Characteristics of Building Materials.
- P. ASTM E96 - Water Vapor Transmission of Materials.
- Q. NFPA 255 - Surface Burning Characteristics of Building Materials.
- R. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product description, list of materials and thickness for equipment scheduled.
- C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

1.06 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum five years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

SECTION 15280 - EQUIPMENT INSULATION

PART 2 PRODUCTS

2.01 GLASS FIBER

- A. Manufacturers:
 - 1. Owens Corning Fiberglass, Mfg. Co.
 - 2. Other acceptable manufacturers offering equivalent products.
 - a) Manville/Schuller
 - b) Knauf Fiberglass GmbH
 - c) Certain Teed Corp.

- B. Insulation: ASTM C547; rigid molded, noncombustible.
 - 1. 'K' value : ASTM C335, 0.24 at 75 degrees F.
 - 2. Minimum Service Temperature: -20 degrees F.
 - 3. Maximum Service Temperature: 300
 - 4. Maximum Moisture Absorption: 0.2 percent by volume.

- C. Vapor Barrier Jacket
 - 1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
 - 3. Secure with self sealing longitudinal laps and butt strips.
 - 4. Secure with outward clinch expanding staples and vapor barrier mastic.

- D. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.

- E. Vapor Barrier Lap Adhesive
 - 1. Manufacturers:
 - a) Armstrong World Industries
 - b) Arrow Adhesives Co.
 - c) 3M.
 - 2. Compatible with insulation.

- F. Fibrous Glass Fabric
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
 - 2. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.

- G. Indoor Vapor Barrier Finish
 - 1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.02 JACKET

- A. Canvas Jacket: UL listed
 - 1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.
 - 2. Lagging Adhesive

SECTION 15280 - EQUIPMENT INSULATION

- a - Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Do not insulate factory insulated equipment.
- C. On exposed equipment, locate insulation and cover seams in least visible locations.
- D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface.
- F. For insulated equipment containing fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 - 2. Finish with glass cloth and adhesive.
 - 3. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.
- G. For equipment in mechanical equipment rooms or in finished spaces, finish with canvas jacket sized for finish painting.
- H. Cover hydrous calcium silicate insulation with metal mesh and finish with heavy coat of insulating cement.
- I. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
- J. Install insulation for equipment requiring access for maintenance, repair, or cleaning, in such a manner that it can be easily removed and replaced without damage.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within

SECTION 15280 - EQUIPMENT INSULATION

10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER INSULATION SCHEDULE

EQUIPMENT	THICKNESS Inch
A. Boiler	Manufacturer's Jackets
B. Boiler Feed Water Storage Tanks	2"
C. Breechings	Section 15575

END OF SECTION

SECTION 15484 - NATURAL GAS & FUEL OIL PIPING AND SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Valves.
- C. Accessories.

1.02 RELATED SECTIONS

- A. Section 09900 - Painting.
- B. Section 15140 - Supports and Anchors.
- C. Section 15190 - Mechanical Identification.
- D. Section 15561 - Water-Tube Boilers.

1.03 REFERENCES

- A. ASME B16.18 - Cast Bronze Solder-Joint Pressure Fittings.
- B. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- C. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes.
- D. ASTM B88 - Seamless Copper Water Tube.
- E. NFPA 30 - Flammable and Combustible Liquids Code.
- F. NFPA 31 - Installation of Oil Burning Equipment.
- G. ANSI B31.1 - Power Piping.
- H. ANSI B31.2 - Fuel Gas Piping.
- I. ANSI B31.4 - Liquid Petroleum Transportation Piping Systems.
- J. ANSI B31.9 - Building Service Piping.
- K. ASME B16.3 - Malleable Iron Threaded Fittings.
- L. NFPA 54 - National Fuel Gas Code.
- M. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

SECTION 15484 - NATURAL GAS & FUEL OIL PIPING AND SPECIALTIES

- N. ASTM A234 - Pipe Fittings or Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include installation instructions, spare parts lists.

1.06 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three year experience.
- B. Installer: Company specializing in performing the work of this section with minimum five year experience.

1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable EPA Regulations for installation of fuel oil system and NFPA 54 for installation of natural gas piping, fittings, valves and accessories.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of fuel oil system.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.10 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.

SECTION 15484 - NATURAL GAS & FUEL OIL PIPING AND SPECIALTIES

- B. Provide two repacking kits for each size valve.

PART 2 PRODUCTS

2.01 FUEL OIL PIPING

- A. Copper Tubing: ASTM B88, Type K annealed.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints: Flared.
- B. Stainless steel flexible hose, suitable for fuel oil #2, for final connection.

2.02 NATURAL GAS PIPING

- A. Steel Pipe: ASTM A53 or A120, Schedule 40, black.
 - 1. Fittings: ASME B16.3, malleable iron.
 - 2. Joints: NFPA 54, threaded.
- B. Stainless steel flexible hose, suitable for natural gas for final connection.

2.03 UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under:
 - 1. Ferrous pipe: 150 psig malleable iron threaded unions.
 - 2. Copper tube: 150 psig bronze unions with brazed joints.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.04 GATE VALVES

- A. Bronze body, bronze trim, non-rising stem, hand wheel, inside screw, single wedge or disc, threaded ends.

2.05 SWING CHECK VALVES

- A. Bronze body, bronze swing disc, threaded ends.

2.06 FUSOMATIC VALVES

- A. Globe valve, bronze body with spring and replaceable fusible element rated for 165 F, threaded ends. Provide three(3) spare fusible elements for each valve. Fusomatic valves shall be equivalent to "Preferred Utilities".

2.07 PLUG VALVES

SECTION 15484 - NATURAL GAS & FUEL OIL PIPING AND SPECIALTIES

- A. Bronze body, bronze tapered plug, non-lubricated, teflon packing, threaded ends.

2.07 GAGES

- A. Dial type with satin black steel case and shatterproof, heat resistant polycarbonate lenses, 0-30 inches mercury vacuum range for vacuum gauges and 0-60 psi for pressure gauges. Gauges shall be equivalent to "Preferred Utilities", Bulletin 20.23.

2.08 STRAINERS

- A. Threaded brass rated for 175 psig working pressure, Y pattern with 1/32" stainless steel perforated screen.

2.09 STRAINER - FILTERS

- A. Cast iron body, rated for 150 psig working pressure, screwed connections with stainless steel perforated 40 mesh strainer. Strainers shall be equivalent to "Preferred Utilities", model # 72. Provide one (1) spare basket for each strainer. Each strainer to be selected for 2-1/2 times the burner maximum firing rate.

PART 3 EXECUTION

3.01 PIPING PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with unions.

3.02 PIPING AND ACCESSORIES INSTALLATION

- A. Install in accordance with manufacturers' instructions.
- B. Extend existing copper fuel oil lines as required for new burners installation. Final connections will be made with stainless steel hoses, to allow access for door swings to boilers.
- C. Extend existing black steel gas piping as required for new burners installation. Final connections will be made with stainless steel hoses, to allow access for door swings to boilers.
- D. Install a 3/4" fusomatic valve on each suction line.
- E. Install a manual strainer, a gate valve, a vacuum gauge, a strainer-

SECTION 15484 - NATURAL GAS & FUEL OIL PIPING AND SPECIALTIES

filter, and a vacuum gage on each suction line and a pressure gauge on each discharge line.

- F. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install to NACE RP-01-69.
- G. Route piping in orderly manner and maintain gradient.
- H. Install piping to conserve building space and not interfere with use of space.
- I. Prepare pipe, fittings, supports, and accessories not Pre-finished, ready for finish painting. Refer to Section 09900.
- J. Identify each piping system, refer to Section 15190.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

END OF SECTION

SECTION 15510 - HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and pipe fittings for:
 - 1. Cold make-up water piping.
 - 2. Equipment drains and overflows.
- B. Valves:
 - 1. Gate valves.
 - 2. Ball valves.
 - 3. Check valves.

1.02 RELATED SECTIONS

- A. Section 09900 - Painting.
- B. Section 15190 - Mechanical Identification.
- C. Section 15260 - Piping Insulation.

1.03 REFERENCES

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B31.9 - Building Services Piping.
- D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- E. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- F. ASTM B32 - Solder Metal.
- G. ASTM B88 - Seamless Copper Water Tube.
- H. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- I. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacture.
- J. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- K. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

SECTION 15510 - HYDRONIC PIPING

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use grooved mechanical couplings and fasteners in accessible locations.
- C. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- D. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- E. Provide pipe hangers and supports in accordance with ASTM B31.9 and MSS SP69 unless indicated otherwise.
- F. Use ball or butterfly valves for shut-off and to isolate equipment, part of systems.
- G. Use ball or butterfly valves for throttling, bypass, or manual flow control services.
- H. Use plug cocks for throttling service. Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.
- I. Use butterfly valves in heating water systems interchangeably with gate and globe valves.
- J. Use lug end butterfly valves to isolate equipment.
- K. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME SEC 9.
- D. Manufacturer's Installation Instructions: Indicate hanging and support

SECTION 15510 - HYDRONIC PIPING

methods, joining procedures.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three year experience.
- B. Installer: Company specializing in performing the work of this section with minimum three year experience.
- C. Welders: Certify in accordance with ASME SEC 9.

1.09 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.11 EXTRA MATERIALS

SECTION 15510 - HYDRONIC PIPING

- A. Furnish under provisions of Section 01700.
- B. Provide two repacking kits for each size and valve type.

PART 2 PRODUCTS

2.01 COLD WATER MAKE-UP PIPING

- A. Copper Tubing: ASTM B88, Type L hard drawn.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 - 3. Joints: Crimped.

2.02 EQUIPMENT DRAINS AND OVERFLOWS

- A. Steel Pipe: ASTM A53, Schedule 40 galvanized.
 - 1. Fittings: Galvanized cast iron, or ASTM B16.3 malleable iron.
 - 2. Joints: Threaded, or grooved mechanical couplings.
- B. Copper Tubing: ASTM B88, Type M.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22 crimp wrought copper.
 - 2. Joints: Crimped.

2.03 UNIONS, FLANGES, AND COUPLINGS

- A. Unions for Pipe 2 Inches and Under:
 - 1. Ferrous Piping: 150 psig malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe Over 2 Inches:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.
 - 2. Copper Piping: Bronze.
 - 3. Gaskets: 1/16 inch thick preformed neoprene.
- C. Grooved and Shouldered Pipe End Couplings:
 - 1. Housing Clamps: Malleable iron to engage and lock, designed to permit some angular deflection, contraction, and expansion.
 - 2. Sealing Gasket: C-shape elastomer composition for operating temperature range from 15 degrees F to 230 degrees F.
 - 3. Accessories: Steel bolts, nuts, and washers.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.04 GATE VALVES

SECTION 15510 - HYDRONIC PIPING

- A. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, screwed union bonnet, non-rising stem, solid wedge disc, alloy seat rings, solder or threaded ends.
- B. Over 2 Inches:
 - 1. Iron body, bronze trim, bolted bonnet, non-rising stem, hand wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged or grooved ends.

2.05 BALL VALVES

- A. Up To and Including 2 Inches:
 - 1. Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.
- B. Over 2 Inches:
 - 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flange.

2.06 SWING CHECK VALVES

- A. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.
- B. Over 2 Inches:
 - 1. Iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable disc and seat, flanged ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 15545

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

SECTION 15510 - HYDRONIC PIPING

- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls and floors.
- F. Slope piping and arrange to drain at low points.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Pipe Hangers and Supports:
 - 1. Install in accordance with ASTM B31.9 and MSS SP89.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Provide sheet lead packing between hanger or support and piping.
 - 7. Prime coat exposed steel hangers and supports. Refer to Section 09900.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15260.
- J. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- L. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 09900.
- M. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

- A. Pipe Hanger Spacing.

PIPE SIZE	HANGER ROD	DIAMETER
	MAX. HANGER SPACING	

15510-6

Boiler Replacement at Holland Hill E.S.

SECTION 15510 - HYDRONIC PIPING

Inches	Feet	Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2

END OF SECTION

SECTION 15515 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air vents.
- B. Strainers.
- C. Relief valves.

1.02 RELATED SECTIONS

- A. Section 15510 - Hydronic Piping.

1.03 REFERENCES

- A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model [and dimensions].
- C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain

SECTION 15515 - HYDRONIC SPECIALTIES

in place until installation.

- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
 - 1. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.02 STRAINERS

- A. Size 2 inch and Under:
 - 1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- B. Size 2-1/2 inch to 4 inch:
 - 1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.03 FLOW CONTROLS

- A. Construction: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psig.
- C. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.
- D. Accessories: In-line strainer on inlet and ball valve on outlet.

2.04 RELIEF VALVES

- D. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.
- E. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- F. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

SECTION 15515 - HYDRONIC SPECIALTIES

- E. Provide valved drain and hose connection on strainer blow down connection.
- G. Provide relief valves on pressure tanks, low pressure side of reducing valves.
- H. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- I. Pipe relief valve outlet to nearest floor drain.
- J. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

END OF SECTION

SECTION 15520 - STEAM AND STEAM CONDENSATE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Valves.
- C. Steam piping system.
- D. Steam condensate piping system.

1.02 RELATED SECTIONS

- A. Section 09900 - Painting.
- B. Section 15121 - Expansion Compensation.
- C. Section 15160 - Seismic Restraints and Vibration Isolation for Mechanical Equipment.
- D. Section 15190 - Mechanical Identification.
- E. Section 15260 - Piping Insulation.
- F. Section 15525 - Steam and Steam Condensate Specialties.

1.03 REFERENCES

- A. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- E. ASME B31.1 - Code for Power Piping.
- F. ASME B31.9 - Building Services Piping.
- G. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- H. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- I. ASTM B32 - Solder Metal.
- J. ASTM B88 - Seamless Copper Water Tube.
- K. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- L. AWS A5.8 - Brazing Filler Metal.
- M. AWS D1.1 - Structural Welding Code.

SECTION 15520 - STEAM AND STEAM CONDENSATE PIPING

- N. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- O. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- P. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.04 SYSTEM DESCRIPTION

- B. When more than one piping system material is selected, ensure systems components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- C. Use unions, flanges, and downstream of valves and at equipment or apparatus connections. Use dielectric unions where joining dissimilar materials. Do not use direct welded or threaded connections.
- D. Provide pipe hangers and supports in accordance with ASTM B31.9 and MSS SP69 unless indicated otherwise.
- E. Use gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- F. Use gate or ball valves for throttling, bypass, or manual flow control services.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- G. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- H. Welders Certificate: Include welders certification of compliance with ASME/SEC 9.
- I. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Record actual locations of valves.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum five years documented experience.

SECTION 15520 - STEAM AND STEAM CONDENSATE PIPING

C. Welders: Certify in accordance with ASME SEC 9.

1.09 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of welders.
- C. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.11 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- B. Provide two repacking kits for each size and valve type.

PART 2 PRODUCTS

2.01 LOW PRESSURE STEAM PIPING (15 PSIG MAXIMUM)

- E. Steel Pipe: ASTM A53, Schedule 40, 0.375 inch wall for up to 8 inch and black.
 - 1. Fittings: ASTM B16.3 malleable iron Class 125, or ASTM A234 forged steel Class 125.
 - 2. Joints: Threaded, or AWS D1.1, welded.

2.02 LOW PRESSURE STEAM CONDENSATE PIPING

- F. Steel Pipe: ASTM A53, Schedule 80, 0.375 inch wall for up to 6 inch and black.
 - 1. Fittings: ASTM B16.3 malleable iron Class 125, or ASTM A234 forged steel Class 125.
 - 2. Joints: Threaded, or AWS D1.1, welded.

2.03 PIPE HANGERS AND SUPPORTS

- A. Conform to [ASME B31.9, MSS SP58, MSS SP69 and MSS SP89.
- G. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.

SECTION 15520 - STEAM AND STEAM CONDENSATE PIPING

- C. Hangers for Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- D. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
- H. Multiple or Trapeze Hangers for Pipe Sizes to 4 inches: Steel channels with welded spacers and hanger rods.
- I. Multiple or Trapeze Hangers for Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods; cast iron roll and stand.
- G. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- H. Wall Support for Pipe Sizes 4 to 5 Inches: Welded steel bracket and wrought steel clamp.
- I. Wall Support for Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll.
- J. Vertical Support: Steel riser clamp.
- K. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- L. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- M. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- N. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- O. Inserts: Malleable iron case of galvanized] steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 UNIONS, FLANGES, AND COUPLINGS

- A. Unions for Pipe 2 Inches and Under:
 - 1. Ferrous Piping: 150 psig galvanized malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe Over 2 Inches:
 - 1. Ferrous Piping: 150 psig forged steel, slip-on.
 - 2. Copper Piping: Bronze.
 - 3. Gaskets: 1/16 inch thick preformed non-asbestos graphite fiber.
- A. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05 GATE VALVES

- A. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, screwed bonnet, non-rising stem, lockshield stem hand wheel, inside screw with back seating stem, solid wedge disc, threaded ends.
- B. Over 2 Inches:

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1. Iron body, bronze trim, bolted bonnet, non-rising stem, hand wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged or grooved ends.

2.06 BALL VALVES

- A. Up To and Including 2 Inches:
 1. Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, threaded ends with union.
- B. Over 2 Inches:
 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive hand wheel for sizes 10 inches and over, flanged.

2.07 SWING CHECK VALVES

- A. Up To and Including 2 Inches:
 1. Bronze or iron body, bronze trim, bronze rotating swing disc with composition seat, threaded ends.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 15545.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Sleeve pipe passing through partitions, walls, and floors.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 15121.
- F. Inserts:
 1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

SECTION 15520 - STEAM AND STEAM CONDENSATE PIPING

- 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut.

- G. Pipe Hangers and Supports:
 - 1. Install in accordance with ASTM B31.9 and [MSS SP89.
 - 2. Support horizontal piping as scheduled.
 - 3. Place hangers within 12 inches of each horizontal elbow.
 - 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 5. Support vertical piping at every [other] floor. Support riser piping independently of connected horizontal piping.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping.
 - 8. Prime coat exposed steel hangers and supports. Refer to Section 09900. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

- D. Provide clearance for installation of insulation and access to valves and fittings.

- I. Provide access where valves and fittings are not exposed.

- J. Slope steam piping one inch in 40 feet (0.25 percent) in the direction of flow. Use eccentric reducers to maintain bottom of pipe level.

- K. Slope steam condensate piping one inch in 40 feet (0.25 percent). Provide drip trap assembly at low points and before control valves. Run condensate lines from trap to nearest condensate receiver. Provide loop vents over trapped sections.

- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09900.

- N. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Pipe Hanger Spacing

PIPE SIZE Inches	HANGER ROD	DIAMETER Inches
	MAX. HANGER SPACING Feet	
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8

END OF SECTION

SECTION 15525 - STEAM AND STEAM CONDENSATE SPECIALTIES

- A. Submit under provisions of Section 01700.
 - B. Operation and Maintenance Data: Include installation instructions, servicing requirements, and recommended spare parts lists.
- 1.06 QUALITY ASSURANCE
- A. Perform Work in accordance ASME standard for installation of boilers and pressure vessels.
- 1.07 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- 1.08 REGULATORY REQUIREMENTS
- A. Conform to ASME B31.9 code for installation of steam and steam condensate piping and specialties.
 - B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose indicated.
- 1.09 DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
 - C. Provide temporary protective coating on cast iron and steel valves.
 - D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
 - E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 STEAM AIR VENTS

- A. 125 psig:
 - 1. Balanced Pressure Type: Cast brass body and cover; access to internal parts without disturbing piping; stainless steel bellows, stainless steel valve and seat.

2.02 SAFETY RELIEF VALVES

- A. Valve: Bronze body, stainless steel valve spring, stem, and trim, direct pressure actuated, capacities ASME certified and labeled.
- B. Accessories: Drip pan elbow.

PART 3 EXECUTION

3.01 INSTALLATION

SECTION 15525 - STEAM AND STEAM CONDENSATE SPECIALTIES

- A. Install specialties in accordance with manufacturer's instructions.
- B. Rate relief valves for pressure upstream of pressure reducing station, for full operating capacity. Set relief at maximum 20 percent above reduced pressure.
- C. Terminate relief valves 6 inches above the finished floor and connect to the nearest floor drain.
- D. When several relief valve vents are connected to a common header, header cross section area shall equal sum of individual vent outlet areas.

END OF SECTION

SECTION 15556 - CAST IRON BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Boiler.
- B. Controls and boiler trim.
- C. Steam and condensate connections.
- D. Fuel connections.
- E. Collector.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15952: Installation of Boiler Control Panel, Gas Flue Temperature Monitors/Cutoffs, etc.

1.03 RELATED SECTIONS

- A. Section 15515 - Hydronic Specialties.
- B. Section 15520 - Steam and Steam Condensate Piping
- C. Section 15525 - Steam and Steam Condensate Specialties.
- D. Section 15952 - Controls and Instrumentation.
- E. Section 15975 - Direct Digital Control System.
- F. Section 15985 - Sequence of Operation.
- G. Section 16180 - Equipment Wiring Systems.

1.04 REFERENCES

- A. AGA - Directory of Certified Appliances and Accessories.
- B. ANSI/AGA Z21.13 - Gas-Fired Low-Pressure Steam and Hot Water Boilers.
- C. ANSI/AGA Z223.1 - National Fuel Gas Code.
- D. ANSI/ASME SEC4 - Boiler and Pressure Vessel Codes - Rules for Construction of Heating Boilers.
- E. ANSI/ASME SEC8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels.
- F. ANSI/NFPA 70 - National Electrical Code.
- G. ANSI/UL 726 - Oil-Fired Boiler Assemblies.
- H. HI (Hydronics Institute) - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01300.

SECTION 15556 - CAST IRON BOILERS

- B. Submit product data indicating general layout, dimensions, and size and location of connections.
 - C. Submit manufacturer's installation instructions under provisions of Section 01300.
- 1.06 OPERATION AND MAINTENANCE DATA
- A. Submit operation and maintenance data under provisions of Section 01700.
 - B. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- 1.07 QUALITY ASSURANCE
- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
- 1.08 REGULATORY REQUIREMENTS
- A. Conform to applicable ANSI/NFPA 70 code for internal wiring of factory wired equipment.
 - B. Conform to ANSI/ASME SEC4 and SEC 8D and ANSI/AGA Z21.13 & ANSI/UL 726 for boiler construction.
 - C. Units: AGA certified, UL labeled.
- 1.09 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to site under provisions of Section 01600.
 - B. Store and protect products under provisions of Section 01600.
 - C. Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.
- 1.10 WARRANTY
- A. Provide ten year pro-rated warranty under provisions of Section 01700.
 - B. Warranty: Include coverage for cast iron boiler sections.
- PART 2 PRODUCTS
- 2.01 MANUFACTURERS
- A. Substitutions: Under provisions of Section 01600.
- 2.02 FABRICATION
- A. Furnish and install a low pressure steam, wet base, cast iron, dual fuel boiler, forced draft type, field erected and provided with a UL listed dual fuel burner, as specified and indicated on drawings. Boiler shall be manufactured in accordance to the I=B=R ratings requirements and ISO 9001 for quality control and carry 10 year warranty against workmanship and defects.

SECTION 15556 - CAST IRON BOILERS

- B. Assemble from cast iron sections with short individual rods, rated for 15 psig as per Section IV of the ANSI/ASME Boilers and Pressure Vessels Code, in strict accordance with the manufacturer's instructions, recommendations and warranty. Cast iron sections shall have sealing grooves for high temperature sealing rope as to assure permanent gas-tight seal. Each port opening shall be machined to completely capture sealing ring between sections. Provide with sufficient tappings to install required controls. Each individual sections shall be hydrostatically pressure tested at factory, and the sections assembly shall be field tested at 50 psi for 24 hours in accordance with Section IV of ANSI/ASME Pressure Vessel Code. Boiler to be provided with an insulated mounting plate having necessary holes and tappings to mount burner, with a cast iron flue collar with a built in adjustable damper capable of being locked in place after adjustment, heavy-gauge steel cleanout plates to cover cleanout openings on the side of boiler, and flexible refractory blankets attached to back and floor construction chamber.
- C. Provide clean-out and access doors, observation ports, and relief openings to flue passages.
- D. Provide structural base of aluminized steel lined with high temperature mineral fiber insulating panels.
- E. Provide heavy-gauge glass fiber insulated steel jacket, finished with factory applied baked enamel.

2.03 STEAM BOILER TRIM

- A. Pressure gage and ASME rated pressure relief valve set at 15 psi.
- B. Water column with cocks, gage glass set, and blowdown valves for glass and column.
- C. UL labeled low water cut-off with ASME working pressure rating equal to the AMME rating of the relief valve, manual reset installed in water column to prevent burner operations when boiler water drops below safe level. Locate so burner shut down if boiler water level falls below allowable waterline or 1/4" above bottom of gauge glass. Steam boiler primary low water cutoff shall be a float auto reset type. The secondary low water cutoff shall be manual reset float type.
- D. Boiler condensate return pump control installed in water column to maintain water level by controlling pump operation.
- E. Operating pressure controller for burner to maintain steam pressure setting.
- F. High limit pressure controller for burner to prevent steam pressure from exceeding shaft system pressure.

2.05 FUEL BURNING SYSTEM

- A. Burner Operation: Hi-Low with low fire position for ignition.
- B. Oil Burner: High pressure atomizing type for No. 2 oil with combustion air blower, fuel pump, hinged flame inspection port, cadmium sulphide flame sensor, electrodes, ignition transformer, and oil nozzle.
- C. Oil Burner Safety Controls: Energize burner motor and electric ignition,

SECTION 15556 - CAST IRON BOILERS

limit time for establishment of main flame, monitor flame continuously during burner operation and stop burner on flame failure with manual reset necessary, solenoid oil delay valve opens after burner motor energized and closes when de-energized.

- D. Gas Burner: Forced draft type for natural gas adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off.
- E. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
- F. Combination Gas-Oil Burner: Burner for natural gas and No. 2 oil built as single unit, equipped with gas pressure regulator and oil-gas selector switch.
- G. Collector and Draft Hood: Natural draft operation equipment as regularly supplied by manufacturer.
- H. Controls: Pre-wired, factory assembled electronic controls in control cabinet with flame scanner or detector, programming control, relays, and switches. Provide pre-purge and post-purge ignition and shut-down of burner in event of ignition pilot and main flame failure with manual reset.

2.06 PERFORMANCE

- A. Performance rating shall be in accordance with HI - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
- B. Provide boiler with characteristics indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount the boiler section assembly on the existing steel beams, and seismically attach this assembly to these beams, allowing expansion & contraction, as required. Employ the services of the certified Structural Engineer, as to provide shop drawings, calculations and details, for review and comment, prior to this installation.
- B. Provide for connection to electrical service. Refer to Section 16180.
- C. Provide connection of gas and fuel oil services in accordance with ANSI/AGA Z223.1 and ANSI/UL 726.
- D. Pipe relief valves to nearest floor drain.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01600, and in the presence of a factory authorized representative, as necessary to provide burner light-off and adjustments.

SECTION 15556 - CAST IRON BOILERS

- B. Submit written Report after start-up including control settings and performance chart of control system.
- C. Instruct the Owner's operating personnel at least (4) hours in the new boiler safe operating and emergency shutdown conditions.
- D. The factory authorized agent shall provide written one year factory service warranty after start-up.

3.03 SCHEDULE

- A. As indicated on drawings.

END OF SECTION

SECTION 15575 - VENTS AND BREECHINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vents and Breeching.

1.02 RELATED SECTIONS

- A. Section 15561 - Water-Tube Boilers.

1.03 REFERENCES

- A. ANSI/ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ANSI/ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- C. ASHRAE - Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems."
- D. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
- F. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- G. UL 441 - Standard for Gas Vents.
- H. UL 641 - Standard for Low Temperature Venting Systems.

1.04 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

1.05 DESIGN REQUIREMENTS

SECTION 15575 - VENTS AND BREECHINGS

- A. All products furnished under this section shall conform to the requirements of NFPA-85A, B, D and NFPA-211. Products shall be listed to UL-103 and shall carry the appropriate UL listing mark or label. The vents and breechings shall be warranted by the manufacturer against defects in material and workmanship for a period of twelve (12) years from the date of the original installation. Any portion of the vents or breechings repaired under warranty shall be warranted for the remainder of the original warranty period.

1.06 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Submit shop drawings indicating general construction, dimensions, weights, support and layout of breechings. Where factory built units are used submit layout Drawings indicating plan view and elevations.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum three years documented experience.

1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable ANSI Z223.1 code for installation of natural gas burning appliances and equipment.

PART 2 PRODUCTS

2.01 VENTS AND BREECHINGS

- A. Furnish and install new vents and breeching, to the extended indicated on drawings.
- B. The dual fuel boilers vents and breechings shall be of insulated positive pressure double-wall design, factory built type for use with equipment burning natural gas and fuel oil # 2, as described in NFPA-211, which produce flue gases exhausted at a temperature not exceeding 1400 F continuously and 1800 F intermittently. The vents & breechings sections shall be constructed of an inner and outer wall. The outer wall shall be constructed of aluminized steel, .025" thickness. The inner wall, forming the flue-gas carrying pipe, shall be constructed of type 304 stainless steel, .035" thickness. Inner and outer walls shall be connected by means of spacer clips which maintain the concentricity of the annular space and allow unobstructed differential thermal expansion of inner and outer walls. The gas vent connectors shall include 1 inch thick. The manufacturer's required clearance to combustible materials will have to be maintained at all times. All inner pipe joints shall be

SECTION 15575 - VENTS AND BREECHINGS

held together by means of tee bands and sealed with P078 Ceramic Sealant. Nuts for the inner and outer bands shall be restrained by means of a free floating cage to allow easy alignment. Screws shall be of the hex head type with shoulder stops and tapered "lead-in" threads for easy starting. Provide all required fittings, supports, auxiliary materials, etc., for a complete operational installation.

C.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions, recommendations and warranty.
- B. Install in accordance with recommendations of ASHRAE - Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and ANSI Z223.1 (NFPA 54).
- C. Install vents and breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- D. Clean breeching during installation, removing dust and debris. Sweep existing chimneys before start-up.
- E. Support and anchor vents and breeching with seismic restraints, as required by Sections 15010 & 15160. Terminate the condensing boilers vents above the roof level in strict accordance with the manufacturer's instructions.
- F. This Contractor shall hire the services of a certified chimney sweeper, to thoroughly clean the existing chimney flues before the start-up can take place.

END OF SECTION

SECTION 15952 - CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Instrumentation.
- B. Boilers Control Panel.
- C. Combustion Air Supply Fans Interlocks: Electric/Electronic.
- D. Integral Boiler's Burner Control System.
- E. Flue Gas Temperature Monitors & Cutouts.
- F. Electric/Electronic Controls.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15525 - Steam and Steam Condensate Specialties: Installation of temperature sensors and gage taps.

1.03 RELATED SECTIONS

- A. Section 15510 - Hydronic Piping.
- B. Section 15515 - Hydronic Specialties.
- C. Section 15520 - Steam and Steam Condensate Piping.
- D. Section 15525 - Steam and Condensate Specialties.
- E. Section 15556 - Cast Iron Boilers.
- F. Section 15975 - Digital Control System.
- G. Section 15985 - Sequence of Operation.

1.04 REFERENCES

- A. ASHRAE 85 - Automatic Control Terminology for Heating, Ventilating, Air Conditioning.
- B. ASME MC85.1 - Terminology for Automatic Control.
- C. ASME B40.1 - Gages.
- D. ASTM E1 - Specification for ASTM Thermometers.

1.05 DEFINITIONS

SECTION 15952 - CONTROLS AND INSTRUMENTATION

- A. Ensure terminology used in submittals conforms to ASHRAE 85. and ASME MC85.1.

1.06 SYSTEM DESCRIPTION

- A. Furnish all labor, materials, equipment and supervision required to completely install and place into satisfactory operation, complete electric/electronic control systems and instrumentation specified below.
- B. Refer to Section 15985 - Sequences of operation.
- C. Boilers Control Panel.
- D. Combustion Air Supply Fans Interlocks: Electric/Electronic.

1.07 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings:
 - 1. Complete wiring diagrams and related manufacturer literature of all devices used for this project.
 - 2. Descriptive data and sequence of operation of equipment and devices.
- C. Product Data: Provide data for each system component.
- D. Manufacturer's Installation Instructions: Include for all manufactured components.
- E. Instrumentation - manufacturer's literature.

1.08 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual location of control components, including panels, thermostats, and sensors.
- B. Revise shop drawings to reflect actual installation and operating sequences.
- D. Include data specified in "Submittals" in final "Record Documents" form.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.

SECTION 15952 - CONTROLS AND INSTRUMENTATION

B. Include interconnection wiring diagrams complete field installed system with identified and numbered, system components and devices.

C. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.10 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.

B. Installer: Company specializing in applying the work of this Section with minimum five years documented experience.

1.11 COORDINATION

A. Ensure installation of components is complementary to installation of similar components in other systems.

B. Coordinate installation of system components with installation of mechanical systems equipment such as boilers/burners assemblies, domestic hot water heaters and combustion air dampers interlocks.

C. Ensure systems are completed and commissioned.

1.12 WARRANTY

A. Provide one year warranty under provisions of Section 01700.

1.13 MAINTENANCE SERVICE

A. Furnish service and maintenance of control system for one year.

B. Provide two complete inspections per year, one in each season, to inspect, calibrate, and adjust controls, and submit written reports.

1.15 EXTRA MATERIALS

A. Submit maintenance materials under provisions of Section 01700.

B. Provide two of each type of exposed sensor under provisions of Section 01700.

PART 2 PRODUCTS

2.01 INSTRUMENTATION

SECTION 15952 - CONTROLS AND INSTRUMENTATION

- A. Industrial thermometer with 9" scale, 6" stem with separable well with extension neck for insulation.
Manufacturers: Taylor, Mueller or Weiss.
- B. Pressure gauges shall meet B40.1-1968 USASI Standard and shall be dial type, 4-1/2" diameter, white enamel face, with black numerals and will have a 1/4" brass gauge cock and a snubber. Range shall be as required.

2.02 BOILERS CONTROLS PANEL

- A. Provide a local boilers control panel as specified and locate where shown on drawings, ISO 9001 certified for quality management system and UL 916 listed for energy management equipment.
- B. The control panel shall operate at 120V/1 Ph, with a maximum power of 30 watts. The control shall be pre-engineered and programmed exclusively for the operation steam heating systems. It shall incorporate the following integral functions: steam outdoor reset, outdoor temperature cutoff, day/night heat level programming, optimum start/stop and system cycling.
- C. This control panel shall be able to monitor the outside air temperature, as to anticipate the heating needs of this building. Each cycle period (usually 60 minutes long but adjustable between 10 minutes and 240 minutes, depending on the building response), divided in a Cycle-ON and a Cycle-Off segment. The length of the Cycle-ON segment will vary with the outdoor air temperature and the Heat Adjustment selection. The colder is outside, the longer ON part of the cycle shall be and the shorter OFF part of the cycle shall be. The heat adjustment selection provides multiple ratios of Cycle-ON to Cycle-OFF that vary based on the building heat dissipation rate.
- D. When the control panel is powered up, the control shall check if the outdoor temperature is below the outdoor cutoff. Then, it shall check, if the return line sensor is above or below its setpoint. This shall be followed by checking the space averaging temperature not exceeding the space average target. If all these conditions are met, the control shall start the heating system or the lead boiler's burner. When the system return line sensor reaches a specified setpoint, the control shall start the heating Cycle-ON, based on the outdoor temperature. The control system shall then switch to the Cycle-OFF during the remainder of the cycle.
- E. The space average feedback operation shall be used to prevent space over heating and to minimize fuel consumption. Provide (4) space temperature sensors in areas located furthest away from the boiler room. The feedback space average operation shall include: smart space average, day and night space average target, and space lockout.
- F. The control panel shall include the following features: (2) independent

SECTION 15952 - CONTROLS AND INSTRUMENTATION

heat adjustments, 7-day electronic time clock schedules, day light savings automatic adjustment, season adjustment, boost adjustment, auto/bypass manual switch, thermal lockout, manual shift to day, cycle length, memory, and shall have an alphanumeric display.

- G. The control panel shall include the following input points: UL listed thermistor outdoor air temperature sensor (located outside of boiler room and covered with sun shield), system return line temperature (located at the steam condensate return at the boilers' feed system), prove input (a dry contact to each boiler's burner), shutdown (a dry contact to each boiler's burner to be used during the maintenance period), and (4) UL listed thermistors space temperature sensors (located in spaces above mentioned. The output points/relays shall include system, each boiler's burner, UL listed auxiliary relays for interlocking operation of the combustion air supply fans with each boiler, and for interlocking operation with each boiler feed pump. Data points shall include: operating mode, day-heat adjustment/night-heat adjustment, day outdoor cutoff/night outdoor cutoff, heating cycle length and system setpoint.
- H. The control panel shall be capable to interface via BACnet communication with the existing "Johnson Controls" Metasys Energy Management System (EMS), as necessary to provide remotely all alarms generated by this control panel.
- I. The control panel shall include local control security, by enabling a secure password to deter unauthorized users.

2.02 COMBUSTION AIR SUPPLY FANS INERLOCKS

- A. Provide interlocks of the dual fuel burners with the existing combustion air supply fans as to operate in sequence with boilers' burners, providing combustion air to the Boiler Room. Each will operate when any boiler's is energized and shall be turned off if any boiler's burner is off. Refer to item "G" above.

2.03 INTEGRAL BOILER'S BURNER CONTROL SYSTEM

- A. The new boiler shall be locally controlled via the Boilers Control Panel and remotely monitored from the existing building's Energy Management System (EMS).
- B. Supply boiler's burner control system to provide safety interlocks and steam temperature control for this boiler. Each control system shall be fully integrated into each burner control cabinet and incorporate single and multiple boiler control logic, inputs, outputs and communication interfaces.
- B. The boiler's control system shall be supplied as part of the factory

SECTION 15952 - CONTROLS AND INSTRUMENTATION

assembled, tested burner control cabinet.

C. This boiler's control system shall communicate locally with the Boilers Control Panel.

D. Refer to section 15561 for additional information.

2.04 BOILERS FEED SYSTEM PUMPS CONTROL PANEL

A. The boilers feed system shall be locally controlled and remotely monitored by the present building's Energy Management System (EMS).

2.05 FLUE GAS TEMPERATURE MONITORS & CUTOUTS

- A. Furnish and install an UL listed flue gas temperature monitor & cutout control panel for each boiler, as specified and where indicated on drawings. Each control panel shall provide low boiler efficiency alarm message & contact, and a burner shutdown contact & message in a NEMA 4 front panel, and shall include a 4-digit numeric LED display with field adjustable menus and flexible communications for data logging. The menu shall include type J or K thermocouple inputs, 4-20 mADS output scaling, Fahrenheit or Centigrade, bargraph scaling, alarm modes, setpoints, deadbands and time delays.
- B. If any flue temperature exceeds the warning setpoint for more than 30 seconds (adjustable), the bargraph shall blink, a warning message shall appear, and the alarm relay shall be energized. If the flue gas temperature continues to increase and exceeds the shutdown setpoint for more than 30 seconds (adjustable), the bargraph shall blink, the "shutdown" message shall appear, the shutdown relay shall de-energize and cutoff the affected boiler's burner, and shall latch into "manual reset mode", a local and alarm bell shall be activated and a remote alarm shall be sent to the existing EMS.

2.06 SENSORS

- A. Provide electronic temperature sensors of supersensitive resistance type, which are vibration free and corrosion-resistant, and of wall mounted, immersion, etc., as required for application.

2.07 ELECTRONIC CONTROLLERS

- A. Provide electronic controllers of "Wheatstone Bridge" amplifier type, designed as individual components and fully protected by steel enclosures, as required by the sequence of operation.

PART 3 EXECUTION

SECTION 15952 - CONTROLS AND INSTRUMENTATION

3.01 FACTORY START-UP

- A. Start-up from the local factory representative. All devices, controls, sensors, wiring, etc., shall be provide by this Contractor as required to provide and operate the above mentioned systems. The local factory representative must provide the start-up of each system and check all related equipment at that time. He/she shall tune the systems to optimum efficiency. The representative shall then relay any problems or required corrections to this Contractor for immediate correction. Additional visits that may be required because of improper connection will be at the expense of this Contractor and not the Owner.
- B. The factory representative shall provide eight (8) hours of minimum instruction to Owner's representatives. This instruction shall be at a date to be specified and coordinated through and from this Contractor. This Contractor shall give all parties concerned five (5)working days notice.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install all sensors, as shown on plans or as required.
- C. Install electrical work in accordance with Section 16180. Electrical material and installation shall be in accordance with appropriate requirements of Division 16.
- D. Prepare and start systems under provisions of Section 01600.
- E. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- F. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.
- G. Provide basic operator training for two persons on data display, alarm and status descriptors. Include a minimum of 8 hours dedicated instructor time.
- H. All control wiring within Boiler Room and where exposed shall be mounted in galvanized steel rigid conduits with liquid tight fittings.

END OF SECTION

SECTION 15975 - DIRECT DIGITAL CONTROL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Connect the new equipment & devices to the building's Energy Management System (EMS) located in the Boiler Room, as indicated on drawings and hereby specified.
- B. Control equipment.
- C. Software.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15510 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gage taps, etc.
- B. Section 15520 - Steam and Steam Condensate Piping: Installation of valves, flow switches, temperature sensor sockets, gage taps, etc.

1.03 RELATED SECTIONS

- A. Section 15952 - Controls and Instrumentation.
- B. Section 15985 - Sequence of Operation.
- C. Division 16 - Equipment Wiring Systems.

1.04 REFERENCES

- A. ASHRAE 85 - Automatic Control Terminology for Heating, Ventilating, Air Conditioning.
- B. ASME MC85.1 - Terminology for Automatic Control.
- C. NEMA EMC1 - Energy Management Systems Definitions.

1.05 DEFINITIONS

- A. Ensure terminology used in submittals conforms to ASHRAE 85, ASME MC85.1, NEMA EMC1.

1.06 SYSTEM DESCRIPTION

- A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units with communications to existing Energy Management System (EMS).
- B. Central and remote hardware, software, and interconnecting wire and conduit.
- C. Terminal unit controls for boilers, combustion air supply fans, etc., unless indicated otherwise.

1.07 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings:
 - 1. Trunk cable schematic showing programmable control unit locations, and

SECTION 15975 - DIRECT DIGITAL CONTROL SYSTEM

- trunk data conductors.
 - 2. List of connected data points, including connected control unit and input device.
 - 3. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
 - 4. System configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
 - 5. Descriptive data and sequence of operation of operating, user, and application software.
- C. Product Data: Provide data for each system component and software module.
- D. Manufacturer's Installation Instructions: Include for all manufactured components.
- 1.08 PROJECT RECORD DOCUMENTS
- A. Submit under provisions of Division 1.
 - B. Accurately record actual location of control components, including panels, temperature sensors, etc..
 - C. Revise shop drawings to reflect actual installation and operating sequences.
 - D. Include data specified in "Submittals" in final "Record Documents" form.
- 1.09 OPERATION AND MAINTENANCE DATA
- A. Submit under provisions of Division 1.
 - B. Include interconnection wiring diagrams complete field installed system with identified and numbered, system components and devices.
 - C. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
 - D. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- 1.10 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.
 - B. Installer: Company specializing in applying the work of this Section with minimum five years Documented experience, approved by manufacturer.
 - C. Design system software under direct supervision of a Professional Engineer experienced in design of this work and licensed at the place where the Project is located in the State of Connecticut.
- 1.11 COORDINATION
- A. Coordinate work under provisions of Division 1.
 - B. Ensure installation of components is complementary to installation of similar components in other systems.
 - C. Coordinate installation of system components with installation of mechanical systems equipment such as boilers, combustion air supply fans,

SECTION 15975 - DIRECT DIGITAL CONTROL SYSTEM

etc.

D. Ensure system is completed and commissioned.

1.12 WARRANTY

A. Provide five year warranty under provisions of Division 1.

B. Warranty: Include coverage for field programmable micro-processor based units.

1.13 MAINTENANCE SERVICE

A. Furnish service and maintenance of energy management and control system for two years.

B. Provide four complete inspections per year, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

1.14 EXTRA MATERIALS

A. Submit maintenance materials under provisions of Division 1.

B. Provide two of each type of exposed sensor under provisions of Division 1.

1.15 PROTECTION OF SOFTWARE RIGHTS

A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:

1. Limiting use of software to equipment provided under these specifications.
2. Limiting copying.
3. Preserving confidentiality.
4. Prohibiting transfer to a third party.

PART 2 PRODUCTS

2.01 LOCAL OPERATOR ACCESS AND DISPLAY PANEL

A. Connect all new boiler room equipment and devices to the present EMS.

2.02 INPUT/OUTPUT SENSORS

A. Provide compatible input/output sensors, as required to meet the sequences of operation indicated on drawings.

2.03 OPERATING SYSTEM SOFTWARE

A. Re-use existing operating software or upgrade, as required.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions, recommendations and warranty.

B. Install electrical work in accordance with Division 16. Electrical material and installation shall be in accordance with appropriate requirements of Division 16.

SECTION 15975 - DIRECT DIGITAL CONTROL SYSTEM

- C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Division 1.
- B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- C. Provide service engineer to instruct Owner's representative in operation of systems plant and equipment for 3 day period.
- D. Provide basic operator training for two persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 40 hours dedicated instructor time.

3.03 DEMONSTRATION

- A. Provide systems demonstration under provisions of Division 1.
- B. Demonstrate complete and operating system to Owner.

END OF SECTION

SECTION 15985 - SEQUENCE OF OPERATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Boilers Control Panel.
- B. Boilers Feed System Pumps Control Panel.
- C. Flue Gas Temperature Monitors & Cutoffs

1.02 RELATED SECTIONS

- A. Section 15952 - Controls and Instrumentation.
- B. Section 15975 - Direct Digital Control System.

1.03 SYSTEM DESCRIPTION

- A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence.
- C. Include flow diagrams for each control system, graphically depicting control logic.
- D. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Accurately record actual set points and settings of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS

Not Used

SECTION 15985 - SEQUENCE OF OPERATION

PART 3 EXECUTION

3.01 Refer to sequences of operation on drawings.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 16.

SUMMARY

This section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

- Submittals.
- Coordination drawings.
- Record documents.
- Maintenance manuals.
- Rough-ins.
- Electrical installations.
- Cutting and patching.

Related Sections: The following sections contain requirements that relate to this section:

Division 15 Sections.

Division 16 Sections for materials and methods common to the remainder of Division 16, plus general related specifications including:

- Access to electrical installations.

SUBMITTALS

General: Follow the procedures specified in Division 1 Section 01300.

RECORD DOCUMENTS

Prepare record documents in accordance with the requirements in Division 1 Section 01700. In addition to the requirements specified in Division 1, indicate installed conditions for:

- Major raceways, size and location; locations of control devices and distribution and branch electrical circuits.

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

Equipment locations (exposed and concealed), dimensioned from prominent building lines.

Approved substitutions, Contract Modifications, and actual equipment and materials installed.

MAINTENANCE MANUALS

Prepare in accordance with Division 1, Section 01730. In addition to the requirements specified in Division 1, include the following information for equipment items:

Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

Servicing instructions and lubrication charts and schedules.

DELIVERY, STORAGE AND HANDLING

Deliver products to the project site properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

ROUGH-IN:

Verify final locations after field measurements and with the requirements of the actual equipment to be connected.

Refer to equipment specifications in Divisions 15 & 16 for rough-in

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

requirements.

ELECTRICAL INSTALLATIONS

General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements.

Coordinate electrical systems, equipment and materials for installation with other building components.

Verify all dimensions by field measurements.

Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.

Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.

Sequences, coordinate and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

Install systems, materials and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.

Install systems, materials and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

All power interruptions must be scheduled with Holland Hill E.S. personnel, at least 48 hours in advance. This is an existing operating facility and will continue to operate during construction. Refer to Section 01010 - Summary of Work, for required work phasing.

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

Conduits must be suspended seismically, as required per 2012 International Building Code (IBC), Section 1621, and as indicated for Zone # 2, as per SMACNA - Seismic Restraint Manual Guidelines for Mechanical Systems - First Edition, 1991. Refer also to Section 16160 - Seismic Restraints and Vibration Isolation for Electrical Equipment and Distribution Systems.

CUTTING AND PATCHING

General: Perform cutting and patching in accordance with Division 1, Section 01045. In addition to the requirements specified in Division 1:

Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.

Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

Protection of the Installed Work: During cutting and patching operations, protect adjacent installations.

Patch existing finished surfaces and building components using new materials matching existing materials and experienced installers.

END OF SECTION

SECTION 16055 - DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Furnish all necessary labor and equipment required to remove and safely dispose all items shown on drawings required or specified below.

1.02 RELATED WORK

- A. Section 16010: Basic Electrical Requirements.

1.03 QUALITY ASSURANCE

- A. All demolition work and removal shall conform to local, state and national codes and regulations which may apply and nothing in these specifications shall be interpreted as an infringement of such codes and regulations.

1.04 SUBMITTALS

- A. Submit for review a schedule of all demolition work and proposed methods of disposal.

PART 2 PRODUCTS

(NOT APPLICABLE)

PART 3 EXECUTION

- 3.01 Remove all electrical work within the contract area, as relates to the removed boiler/burner unit, etc., as indicated or required.
- 3.02 Relocate existing conduits, junction boxes, wiring, etc., in conflict with new equipment, devices, etc.
- 3.03 All existing abandoned or disused electrical work within contract area shall be removed completely back to the last active device, regardless of the location of said device.
- 3.04 All active items within the contract area which service the contract area and beyond the contract area shall be maintained in service.
- 3.05 Remove and relocate all existing electrical work as necessary for coordination with the work of other trades.
- 3.06 All exposed conduit and accessories shall be completely removed including

SECTION 16055 - DEMOLITION

hangers, fittings, etc.

Disused conduit embedded in the building structure shall be stubbed off as close to the structure as practicable.

- 3.07 All removed equipment shall become the Contractors' property unless otherwise noted and/or specified, or requested by Owner's representative, and shall be removed from the premises in entirety and safely disposed of in accordance with all local, state and federal regulations.
- 3.08 Contractor shall pay for all disposal cost incurred in conjunction with the work.

END OF SECTION

SECTION 16110 -RACEWAYS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions, Division 1, 9 & 15 sections, apply to the work specified in this section.
- B. The Contractor will be held responsible for the accurate layout of his work, determination of all openings and coordination with other trades.

1.02 DESCRIPTION OF WORK

- A. Scope of the work shall include, but not necessarily be limited to, the following:

- 1. Provide raceway systems complete with boxes, fittings and accessories, as specified and as required.
- 2. Conduit or tubing sizes referred to in the Specifications and on the drawings are nominal internal diameters.
- 3. The items noted in this section include the following:

Rigid steel conduit

Flexible steel conduit

Raceway fittings

Fire sealants

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. All Sections - Division 16.

1.04 QUALITY ASSURANCE

- A. Codes and Standards
- B. All work shall comply with 2016 Connecticut State Building and Fire Safety Codes, 2014 National Electric Code, and other applicable local codes and regulations which may apply, including the requirements of local utility companies and nothing on the drawings or in specifications shall be interpreted as an infringement of such codes or regulations.
- C. Provide products and components which have been UL listed and labeled.

1.05 SUBMITTALS

SECTION 16110 -RACEWAYS

- A. Submit manufacturer's data for each type of raceway including the types of boxes, fittings and accessories to be provided.

PART 2 PRODUCTS

2.01 MATERIALS

A. Raceways

- 1. Rigid steel conduit: shall be zinc-coated, threaded type conforming to FS WW-C-581, ANSI C80.1 and UL 6.
- 2. Flexible steel conduit: shall be continuous single strip, galvanized, minimum 3/4", except as noted or required for wiring.

B. Fittings and Accessories

1. Raceway fitting

Rigid steel conduit fittings shall be cast malleable iron, galvanized or cadmium plated, conforming to FS W-F-408.

Flexible steel conduit: shall have angle wedge type fittings with insulated throat.

2. Fire Sealants

Provide fire sealants similar to Chase Foam, CTC PR-855 fire resistant foam sealant, or Nelson Flameseal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Raceways

- 1. Raceways shall be run exposed parallel with or at right angles to walls.
- 2. Raceway supports shall be provided by means of: ceiling trapeze, strap hangers, or wall brackets. Provide U-bolts at each floor level or riser raceways and connected to acceptable supports. Secure raceways to supports with conduit straps or U-bolts. Supports spacing shall be as follows: 10 ft. on centers for rigid conduit.
- 3. Mount supports to structure with: toggle bolts on hollow masonry, expansion shields or inserts on concrete and

SECTION 16110 -RACEWAYS

brick, machine screws on metal, wood screws on wood. Nails, raw plugs or wood plugs are not permitted.

4. Allow a 3" minimum separation between raceways and between steam and hot water pipes, except at crossings allow a minimum of 1" from pipe cover.
5. Keep raceways clear of motor foundations and from underside of boilers.
6. In walls, run raceways vertically only.
7. Maintain grounding continuity of interrupted metal raceways with ground conductor.
8. For empty raceways over 10 ft. long, provide fish or pull wire. Pull wire shall consist of steel core nylon rope and terminal ball.
9. Use rigid steel zinc-coated conduit in Boiler Room.
10. Use watertight flexible metallic conduit for final 24" of connection to control items subject to movement or vibration.
11. Construct locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening. Bushings for terminating conduits smaller than 1-1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation. Install insulated type bushings for terminating conduits 1-1/4" and larger. Bushings are to have flared bottom and ribbed sides. Upper edges to have phenolic insulating ring molded into bushing. Bushing of standard or insulated type to have screw type grounding terminal. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs to be specifically designed for their particular application.

3.02 TESTING

- A. Contractor to perform continuity tests by testing the resistance of all feeder conduits from the service to the point of final distribution. The maximum resistance shall be 25 ohms.

END OF SECTION

SECTION 16120 - WIRES AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General and Supplemental Conditions and Special Conditions, Divisions 1 & 9 apply to the work specified in this section.
- B. The Contractor will be held responsible for the accurate layout of his work, determination of all openings and coordination with other trades.

1.02 QUALITY ASSURANCE

A. Codes and Standards

- 1. All work shall comply with 2016 Connecticut State Building and Fire Safety Building Codes, 2014 National Electric Code and local codes and regulations which may apply, including the requirements of local utility companies and nothing on the drawings or in specifications shall be interpreted as an infringement of such codes or regulations.

1.03 EQUIPMENT STANDARDS

A. Conductors shall comply with the following standards:

- 1. ICEA/NEMA standards for thermoplastic insulated wire and cable ICEA S-61-402/NEMA WC-5-1973 including revision No. 5, May 1980.
- 2. 2011 National Electrical Code.

1.04 WORK SPECIFIED ELSEWHERE

- A. Raceways - Section 16110.
- B. Electrical Boxes and Fittings - Section 16135

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. All wire shall be copper, Type THHN, THWN or XHHW rated 600 volts unless otherwise indicated on the drawings, required by the National Electrical Code, or specified in Division 16. Conductors installed for lighting system branch circuits and switch legs shall be type THWN or THHN

SECTION 16120 - WIRES AND CABLES

unless conductors are installed where fixtures are used as raceway in which case they shall be 90 degrees C. Type THHN or XHHN. All conductors shall have size, grade of insulation, voltage and manufacturer's name permanently marked on the outer cover at intervals not exceeding 24". Minimum size shall be No. 12 AWG unless specifically indicated otherwise. Where conductors No. 8 AWG and smaller are specified to be stranded, conductors shall be terminated with crimp type lug or stud.

2.02 CONTROL CONDUCTORS

- A. Control Conductors for use on 120 volt control wiring systems shall be No. 14 AWG stranded type THW, THWN or XHHN, unless otherwise indicated.

2.03 SPLICES

- A. Splices in conductors No. 10 AWG or smaller shall be made with Scotchlok spring connectors, Ideal wingnuts or Buchanan steel crimping sleeves with nylon cap. Splices in conductors larger than No. 8 AWG shall be made with split bolt connectors taped with No. 88 electrical tape unless conductors are specifically indicated or specified to be spliced with crimping sleeve applied with hydraulic operated crimping tool and taped with No. 88 electrical tape.

PART 3 EXECUTION

3.01 BRANCH CIRCUIT AND FEEDER CONDUCTORS

- A. All branch circuit and feeder conductors, No. 8 AWG and smaller shall be color coded as follows: 208Y/120 volt three phase, four wire wye system, Phase A--Black, Phase B--Red, Phase C--Blue, Neutral White, Equipment Ground Green. Provide round conductor in all feeder, branch, and motor circuits. Wires No. 8 AWG and larger shall be stranded.

3.02 FEEDER AND BRANCH CIRCUIT CONDUCTORS

- A. All feeder and branch circuit conductors No. 6 AWG and larger shall be phase identified in each accessible enclosure by one inch wide plastic tape attached to conductors in a readily visible location. Tape colors shall match color code requirements specified.

3.03 BRANCH CIRCUIT CONDUCTORS

- A. All branch circuit conductors shall be connected as indicated on the

SECTION 16120 - WIRES AND CABLES

drawings. Not more than three branch circuits, of opposite phases, shall be installed in any one conduit on 3-phase, 4-wire systems and not more than two branch circuits, of opposite phase, shall be installed in any one conduit on 1-phase, 3-wire systems, unless specifically indicated otherwise on the drawings.

3.04 SPLICES IN CONDUCTORS

- A. Splices in conductors shall be made only within junction boxes, wiring troughs and other enclosures as permitted by the National Electrical Code, latest edition. Do not splice conductors in panel boards, safety switches, switchboards, switchgear, or motor control enclosures.

3.05 CONDUCTORS FOR 120 VOLT CONTROL WIRING

- A. Conductors used only for 120 volt control wiring systems need not be color coded. Where control conductors terminate on terminal strip, make termination with lug applied to conductor with crimping tool.

3.06 PHASE ROTATION

- A. Phase rotation established at service equipment shall be maintained throughout entire project.

END OF SECTION

SECTION 16135 - ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 & 9 Specification sections, apply to work of this section.
- B. This section is a Division 16 Basic Electrical Materials and Methods section, and is a part of each Division 16 section making reference to electrical wiring boxes and fittings specified herein.

1.02 DESCRIPTION OF WORK:

- A. Provide electrical box and associated fitting work as indicated by drawings, or as required and specified below.
- B. Types of electrical boxes and fittings specified in this section include the following:

- Junction boxes.
- Pull boxes.
- Bushings.
- Locknuts.
- Knockout closures.

1.03 QUALITY ASSUARANCE:

- A. Manufacturers: Firms regularly engaged in manufacturing of electrical boxes and fittings, of types, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects utilizing electrical boxes and fittings similar to those required for this project.
- C. NEC Compliance: Comply with NEC as applicable to Construction and installation of electrical wiring boxes and fittings.
- D. UL Compliance: Comply with applicable requirements of UL 50, UL 514-Series, and UL 886 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings which are UL-listed and labeled.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2 and Pub 250 pertaining to outlet and device boxes, covers and box supports.

SECTION 16135 - ELECTRICAL BOXES AND FITTINGS

PART 2 PRODUCTS

2.01 FABRICATED MATERIALS:

- A. Device Boxes: Provide galvanized coated flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as required, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding.
- B. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliance option.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering outlet boxes which may be incorporated in the work include, but are not limited to, the following:

Bell Electric; Square D Company.
Eagle Electric Mfg Co., Inc.
Midland-Ross Corp.
OZ/Gedney; General Signal Co.
Pass and Seymour, Inc.
Thomas & Betts Co.

- C. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering junction and pull boxes which may be incorporated in the work include, but are not limited to, the following:

Adalet-PLM Div, Scott Fetzer Co.
Arrow-Hart Div; Crouse-Hinds Co.
Bell Electric; Square D Company.
GTE Corporation.
OZ/Gedney Co.; General Signal Co.

SECTION 16135 - ELECTRICAL BOXES AND FITTINGS

Spring City Electrical Mfg Co.

D. Bushings, Knockout Closures and Locknuts: Provide corrosion- resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering bushings, knockout closures, locknuts, and connectors which may be incorporated in the work include, but are not limited to, the following:

Adalet-PLM Div; Scott Fetzer Co.
AMP, Inc.
Arrow-Hart Div; Crouse-Hinds Co.
Appleton Electric Co.; Emerson Electric Co.
Bell Electric; Square D Co.
Midland-Ross Corp.
Midwest Electric; Cooper Industries Inc.
OZ/Gedney Co.; General Signal Co.
RACO Div; Harvey Hubbell Inc.
Thomas & Betts Co., Inc.

PART 3 EXECUTION

3.01 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

- A. General: Install electrical boxes and fittings as indicated in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- C. Provide weather tight outlets for interior locations exposed to weather or moisture.
- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.
- F. Avoid installing aluminum products in concrete.

SECTION 16135 - ELECTRICAL BOXES AND FITTINGS

- G. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.
- H. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
- I. Subsequent to installation of boxes, protect boxes from construction debris and damage.

3.02 GROUNDING:

- A. Upon completion of installation work, properly ground electrical boxes and demonstrate compliance with requirements.

END OF SECTION

SECTION 16142 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 & 9 Specification sections, apply to work of this section.
- B. This section is a Division 16 Basic Electrical Materials and Methods section, and is part of each Division 15 and 16 section making reference to electrical connections for equipment specified herein.

1.02 DESCRIPTION OF WORK:

- A. Electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.
- B. Applications of electrical power connections specified in this section include the following:
 - 1. To service and distribution equipment.
 - 2. From electrical source to motor starters.
 - 3. To grounds including earthing connections.
 - 4. To automatic temperature controls.
- C. Electrical connections for equipment, not furnished as integral part of equipment, are specified in Division 15 and other Division 16 sections, and are work of this section.
- D. Motor starters and controllers, not furnished as integral part of equipment, are specified in applicable Division 16 sections, and are work of this section.
- E. Refer to Division 15 sections for motor starters and controllers furnished integrally with equipment; not work of this section.
- F. Junction boxes and disconnect switches required for connecting motors and other electrical units of equipment are specified in applicable Division 16 sections, and are work of this section.
- G. Electrical identification for wire/cable conductors is specified in Division 16 section, Section 16195, and is work of this section.
- H. Raceways and wires/cables required for connecting motors and other electrical units of equipment are specified in applicable Division 16

SECTION 16142 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

sections, and are work of this section.

- I. Refer to Division 15 sections for control system wiring; not work of this section.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors and terminals, of types and ratings required, and ancillary connection materials, including electrical insulating tape, soldering fluxes, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firms with at least 2 years of successful installation experience with projects utilizing electrical connections for equipment similar to that required for this project.
- C. NEC Compliance: Comply with applicable requirements of NEC as to type products used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters, and disconnect switches.
- D. IEEE Compliance: Comply with Std 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to connections and terminations.
- E. ANSI Compliance: Comply with applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.
- F. UL Compliance: Comply with UL Std 486A, "Wire Connectors and Soldering Lugs for Use With Copper Conductors" including, but not limited to, tightening of electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL-listed and -labeled.

1.04 SUBMITTALS:

- A. Product Data: Submit manufacturer's data on electrical connections for equipment products and materials.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver electrical connection products wrapped in proper factory-fabricated type containers.
- B. Store electrical connection products in original cartons and protect from weather, construction traffic and debris.

SECTION 16142 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

- B. Handle electrical connection products carefully to prevent breakage, denting, and scoring finish.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

- AMP Incorporated.
- Appleton Electric Co.
- Atlas Technologies, Inc.
- Bishop Div, General Signal Corp.
- Burndy Corporation.
- Eagle Electric Mfg Co., Inc.
- Electroline Mfg Co.
- Gould, Inc.
- Ideal Industries, Inc.
- Reliable Electric Co.
- Square D Company.
- Thomas and Betts Corp.

2.02 MATERIALS AND COMPONENTS:

- A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.
- B. Wires, Cables, and Connectors:
 - 1. General: Provide wires, cables, and connectors complying with Division-16 basic electrical materials and methods section "16120-Wires and Cables".
- C. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20 deg. C (68 deg. F).
- D. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

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- D. Electrical Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, electrical solder, electrical soldering flux, wire nuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 EXECUTION

3.01 INSPECTION:

- A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF ELECTRICAL CONNECTIONS:

- A. Install electrical connections as indicated; in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.
- B. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.
- C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.
- D. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.
- E. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.
- F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.
- G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet

SECTION 16142 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:

1. Dripping oil, grease, or water.

I. Fasten identification markers to each electrical power supply wire/cable conductor which indicates their voltage, phase and feeder number in accordance with Division-16 section "Electrical Identification". Affix markers on each terminal conductor, as close as possible to the point of connection.

3.03 FIELD QUALITY CONTROL:

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 16160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR ELECTRICAL
EQUIPMENT AND DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION

- A. It is the intend of this specification to provide the basis of seismic design for all components of the electrical system, including conduit, and equipment within the building.
- B. All systems must be installed and certified to remain in place and operating when subjected to a seismic force not less than 1/2 "G" acceleration.
- C. This specification is intended to assure compliance with all criteria established in the 2012 International Building Code, Section 1613.
- D. Owner Purchased and/or field fabricated equipment and systems must comply with this specification.

1.2 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to extend referenced.

1. Federal Specifications (Fed. Specs.)

RR-W-410D Wire Rope and Strand

2. American National Standards Institute, Inc. (ANSI)
Standards:

B18.2.1 - 1981 Square and Hex Bolts and Screws
Inch Series

B18.2.2 - 1972 Square and Hex Nuts

3. American Society for Testing and Materials (ASTM) Publications:

A 36-84a Structural Steel

A 307-84 Carbon Steel Externally Threaded
Standard Fasteners

A 325-85 High-Strength Bolts for Structural
Steel Joints

A 501-84 Hot-Formed Welded and Seamless Carbon
Steel Structural Tubing

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A 576-81 Steel Bars, Carbon, Hot-Wrought,
Special Quality

A 580-78 Application of Ceiling Suspension Systems for Acoustical
Lay-In Panels.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data:

1. Catalog cuts and data sheets on specific vibration isolators and restraints to be utilized, showing compliance with the specifications and detailing all dimensional data of items supplied for this section.
2. An itemized list showing all equipment or conduit to be isolated or restrained under this section.

C. Shop Drawings

1. Drawings are required to show equipment base tie-downs including dimensions, structural members sizes and support point locations.
2. Drawings showing methods of suspension and materials for restraints of conduit and suspended equipment.
3. Drawings showing housekeeping pad dimensions and steel layout for equipment using cast-in-place anchor plates for welding to equipment flanges.
4. Drawings showing number, location, diameter and embedment depth of anchor bolts on equipment not using welded plate assemblies.

1.4 MANUFACTURER RESPONSIBILITIES

A. Manufacturer of vibration isolation and seismic control equipment shall have the following responsibilities:

1. Determine vibration isolation systems and seismic restraints locations.
2. Guarantee specified isolation system deflection.
3. Provide installation instructions, drawings and field supervision to assure proper installation and performance.

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PART 2 PRODUCTS

2.1 DESCRIPTION

- A. All vibration isolation and seismic devices shall be the product of a single manufacturer. Products of other manufacturers are acceptable provided their systems strictly comply with the design intent, performance, deflection and structural design of base manufacturer.

2.2 QUALIFICATIONS

- A. Only firms having 10 year experience designing and manufacturing seismic devices shall be capable of work with this specification. Vibration control seismic manufacturer shall submit project listing to this effect.

2.3 MATERIALS AND EQUIPMENT shall conform to the respective specifications and other requirements specified below:

2.3.1 Bolts and Nuts:

- A. Square head bolts and heavy hexagon nuts, ANSI B18.2.1. and B.18.2.2, and ASTM A 307 OR A 576. Underground bolts shall be ASTM A 325.
- B. All rigidly mounted equipment will have a minimum of four anchor bolts securely fasten trough bases. Anchor bolts must conform to ASTM A 307.

2.3.2 Sway Braces: Material used shall be ASTM A 36 for structural steel and ASTM A 501 for steel piping.

2.3.3 Flexible Couplings: Flexible couplings shall have same pressure ratings as adjoining pipe/conduit. Sleeve-type couplings shall be used for joining plain-end pipe/conduit sections. The couplings shall consist of one steel middle ring, two steel followers, two gaskets, and necessary steel bolts and nuts to compress gaskets. Underground bolts shall be high-strength type as specified hereinbefore.

2.3.4 Seismic Restraints Types

A. General

- 1. All seismic restraints shall be capable of safely accepting 1/2 "G" external forces without failure, or 1 "G" for life safety equipment, conduit, bus duct and in a captive position. They shall be provided on all equipment as required.

SECTION 16160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR ELECTRICAL
EQUIPMENT AND DISTRIBUTION SYSTEMS

- a. Spring Seismic Restraint, Type I: Shall comply with general characteristics of spring isolators. Shall incorporate snubbing restraint in all directions. Shall be capable of supporting equipment at a fixed elevation during equipment erection. System to be field bolted or welded to deck with 1 G acceleration capability.

"Mason Industries", type SSLFH or equivalent.

- b. Seismic Restraint, Type II: Each corner or side shall incorporate a seismic restraint having a minimum 5/8" thick resilient pad limit stops working in all directions. Restraints shall be made of plate structural members or square metal tubing concentric within a welded assembly incorporated resilient pads. Angle bumpers are not acceptable. System to be field bolted or welded to deck with 1 G acceleration capability.

"Mason Industries", Type Z-1011 and Z-1225 or equivalent.

- c. Seismic Restraint, Type III: Metal cable type with approved end fastening devices to equipment and structure. System to be field bolted to deck or overhead structural members using two sided beam clams to steel or appropriately designed inserts for concrete. All parts of system including cables, clams, excluding fastenings are to be single vendor furnished to assure seismic compliance.

"Mason Industries", Type SCB or equivalent.

- d. Seismic Restraint, Type IV: Double deflection neoprene isolator encased in ductile iron or steel casing minimum .30 static deflection. System to be field bolted or welded to deck with 1 G acceleration capability.

"Mason Industries", Type BR or equivalent.

- e. Seismic Restraint, Type V: Non-isolated equipment to be field bolted or welded (powder shots not acceptable) to resist seismic forces under 100# shear force required.

B. Vibration Isolator Types:

1. Type A: Spring isolators shall incorporate the following:

- a. Minimum diameter of 0.8 of the loaded operating height.
- b. Corrosion resistance where exposed to corrosive

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EQUIPMENT AND DISTRIBUTION SYSTEMS

environment with:

1. Spring cadmium plated or electro-galvanized.
 2. Hardware cadmium plated.
 3. All other metal parts hot-dip galvanized.
- c. Reserve deflection (from loaded to solid height) of 50% of rated deflection.
- d. Minimum 1/4" thick neoprene acoustical base pad on underside, unless designated otherwise.
- e. Designed and installed so that ends of springs remain parallel and all springs installed with adjustment bolts.
- f. Non-resonant with equipment forcing frequencies or support structure natural frequencies.

"Mason Industries", Type SLF or equivalent.

Note: This isolator must be accompanied by seismic isolator Type II.

2. Type B: Spring isolators shall be same as Type A, except:

- a. Provide built-in vertical limit stops with minimum 1/4" clearance under normal operation.
- b. Trapped holes in top plate for bolting to equipment when subject to wind load.
- c. Capable of supporting equipment at a fixed elevation during equipment erection. Installed and operating heights shall be identical.
- d. Adjustable and removable spring pack with separate neoprene pad isolation.
- e. Housing to be designed to accept 1 G of acceleration.
- f. Requires bolting on welding to meet acceleration criteria.

"Mason Industries", Type SLR or equivalent.

3. Type C: Spring hanger rod isolators shall incorporate the following:

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- a. Spring element seated on a steel washer within a neoprene cup incorporating a rod isolation bushing.
- b. Steel retainer box encasing the spring and neoprene cup.
- c. Requires seismic restraint Type III.

"Mason Industries", Type HS or equivalent.

4. Type D: Seismic Restraint, Type IV: Double deflection neoprene isolator encased in ductile iron or steel casing minimum .30 static deflection. System to be field bolted or welded to deck with 1 G acceleration capacity.

"Mason Industries", Type BR, RBA or equivalent.

5. Type E: Elastomer hanger rod isolators shall incorporate the following:
 - a. Molded unit type neoprene element with projecting bushing lining rod clearance hole.
 - b. Neoprene element to be minimum 1-3/4" thick.
 - c. Steel retainer box encasing neoprene mounting.
 - d. Clearance between mounting hanger rod and neoprene bushing shall be minimum of 1/8".
 - e. Minimum static deflection of 0.35".
 - f. Requires seismic restraint Type III.

"Mason Industries", Type HD or equivalent.

6. Type F: Combination spring/elastomer hanger rod isolators shall incorporate the following:
 - a. Spring and neoprene isolator elements in a steel box retainer. Neoprene of double deflection type. Single deflection is unacceptable. Spring seated in a neoprene cup with extended rod bushing.
 - b. Characteristics of spring and neoprene as described Type A and type E isolators.
 - c. Requires seismic restraint Type III

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"Mason Industries", Type DNHS or equivalent.

7. Type G: Pad type elastomer mountings to incorporate the following:
 - a. 0.75" minimum thickness.
 - b. 50 psi maximum loading.
 - c. Ribbed or waffled design.
 - d. .10" deflection per pad thickness.
 - e. 1/16" galvanized steel plate between multiple layers or pad thickness.
 - f. Suitable bearing plate to distribute load.

"Mason Industries", Type Super W or equivalent.

8. Type H: Pad type elastomer mountings to incorporate the following:
 - a. Laminate canvas duck and neoprene.
 - b. Maximum loading 1000 psi.
 - c. Suitable bearing plate to distribute load.
 - d. Minimum thickness, 1/2".

"Mason Industries", Type HL or equivalent.

9. Type I: Isolated Clevis:

Vibration isolation manufacturer shall provide an isolated clevis hanger for pipe/conduit support that combines a rod roller hanger and a Type (C, E or F) isolation hanger into one assembly.

10. Type K: Pipe/conduit anchors:

Vibration isolator manufacturer shall provide an all directional pipe/conduit anchor, consisting of a telescopic arrangement of two sizes of steel tubing separated by a minimum half inch thickness of heavy duty neoprene and duck or neoprene isolation material. Vertical restraints shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on

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the isolation material shall not exceed 500 psi and the design shall be balanced for equal resistance in any direction. Isolation to be bolted or welded depending on structure.

"Mason Industries", Type ADA or equivalent.

PART 3 EXECUTION

3.1 GENERAL

- A. All seismic bracing and tie downs shall be installed in accordance with manufacturer's written instructions.
- B. All conduit 2-1/2" and over shall use Type III cable bracing.
- C. Any conduit or suspended equipment supported by rods 12" or less in length from the underside of the structural connection to the top of the conduit does not require any bracing.
- D. All connections to the structure shall be made to steel where possible. Any anchoring to the deck above must be approved by the Structural Engineer.
- E. Seismically restrain all conduit and bus duct with Type III restraining system in accordance with guideline outlined below:
 - 1. Piping/conduit to be braced at 40 foot intervals and at turns of more than 4 feet.
 - 2. Piping/conduit to be restrained as required.
- E. For overhead supported equipment and systems, overstress of the building structure must not occur. Bracing can occur from:
 - 1. Flanges of structural beams.
 - 2. Upper and lower truss chords in bar joist construction at the panel points.

3.2 EQUIPMENT & SYSTEMS INCLUDED

- A. For reference purposes all equipment listed below must be included in the substantial package certifying appropriate seismic restraints have been utilized to meet the full intend of this specification.
 - 1. Conduit Runs
 - 2. Cable Trays and Racks

SECTION 16160 - SEISMIC RESTRAINTS AND VIBRATION ISOLATION FOR ELECTRICAL
EQUIPMENT AND DISTRIBUTION SYSTEMS

3.3 INSPECTION

- A. On completion of installation of all vibration Isolation devices herein specified, the local manufacturer's representative shall inspect the complete system and report in writing any installation error, improperly elected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Engineer, including the manufacturer's representatives final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

END OF SECTION

SECTION 16170 - CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes circuit and motor disconnects.

1.03 SUBMITTALS

- A. Product data for each type of product specified.
- B. Maintenance data for circuit and motor disconnects and for inclusion in Operation and Maintenance Manual specified in Division 1 and Division 16, Section 16010.

1.04 QUALITY ASSURANCE

- A. Electrical Component Standards: Provide components complying with 2014 NFPA 70 "National Electrical Code" and which are listed and labeled by UL. Comply with UL Standard 98, NEMA Standard KS 1 and NECA Standard of Installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

- Appleton
- Challenger
- Crouse-Hinds Co.
- Cutler-Hammer Inc.
- Furnas Electric Co.
- General Electric Co.
- General Switch Corp.
- Square D Company.
- Westinghouse Electric Corp.

2.02 DISCONNECT SWITCHES

SECTION 16170 - CIRCUIT AND MOTOR DISCONNECTS

- A. General: Provide circuit and motor disconnect switches in types, sizes, duties, features, ratings, and enclosures as indicated. Provide NEMA 1 enclosure except for outdoor switches, and other indicated locations. For motor and motor starter disconnects, provide units with horsepower ratings suitable to the loads.
- B. Non-fusible Disconnects: general duty switches of classes and current ratings as indicated.
- C. Service Switches: heavy duty fusible switches. UL listed use as service equipment under UL Standard 98 or 869.

2.03 ACCESSORIES

- A. Electrical Interlocks: Provide number and arrangement of interlock contacts in switches as indicated.

PART 3 EXECUTION

3.01 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECTS

- A. General: Provide circuit and motor disconnect switches and as indicated and where required. Comply with manufacturers' printed installation instructions.

3.02 FIELD QUALITY CONTROL

- A. Testing: Subsequent to completion of installation of electrical disconnect switches energize circuits and demonstrate capability and compliance with. Except as otherwise indicated, do not test switches by operating them under load. However, demonstrate switch operation through six opening/closing cycles with circuit unload. Open each switch enclosure for inspection of interior, mechanical and electrical connections, fuse installation, and for verification of type and rating of fuses installed. Correct deficiencies then retest to demonstrate compliance. Remove and replace defective units with new units and retest.

END OF SECTION

SECTION 16190 - SUPPORT DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 & 9 Specification sections, apply to work of this section.
- B. This section is a Division 16 Basic Electrical Materials and Methods section, and is a part of each Division 16 section making reference to electrical supporting devices specified herein.

1.02 DESCRIPTION OF WORK:

- A. Extend of supports, anchors, is indicated by drawings and schedules and/or specified in other Division 16 sections.
- B. Types of supports, anchors, specified in this section include the following:

- Clevis hangers.
- C-clamps.
- I-beam clamps.
- One hole conduit straps.
- Two-hole conduit straps.
- Round steel rods.
- Lead expansion anchors.
- Toggle bolts.

- C. Supports and anchors, furnished as part of factory-fabricated equipment, are specified as part of that equipment assembly in other Division 16 sections.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of supporting devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualification: Firm with at least 3 years of successful installation experience with projects utilizing electrical supporting device work similar to that required for this project.
- C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of electrical supporting devices.
- D. MSS Compliance: Comply with applicable MSS standard requirements pertaining to fabrication and installation practices for pipe hangers and supports.

SECTION 16190 - SUPPORT DEVICES

- E. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.
- F. UL Compliance: Provide electrical components which are UL-listed and labeled.

PART 2 PRODUCTS

2.01 MANUFACTURED SUPPORTING DEVICES:

- A. General: Provide supporting devices which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one type of supporting device meets indicated requirements, selection is Installer's option.
- B. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:
 - 1. Clevis Hangers: For supporting rigid metal conduit; galvanized steel; with 1/2" dia. hole for round steel rod; approximately 54 pounds per 100 units.
 - 2. Reducing Couplings: Steel rod reducing coupling, 1/2" x 5/8"; black steel; approximately 16 pounds per 100 units.
 - 3. C-Clamps: Black malleable iron; 1/2" rod size; approximately 70 pounds per 100 units.
 - 4. I-Beam Clamps: Galvanized steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange with 2"; approximately 52 pounds per 100 units.
 - 5. One-Hole Conduit Straps: For supporting rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.
 - 6. Two-Hole Conduit Straps: For supporting rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.
 - 7. Hexagon Nuts: For 1/2" rod size; galvanized steel; approximately 4 pounds per 100 units.
 - 8. Round Steel Rod: Black steel; 1/2" dia.; approximately 67 pounds per 100 feet.
 - 9. Offset Conduit Clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pound per 100 units.

SECTION 16190 - SUPPORT DEVICES

10. Anchors: Provide anchors of types, sizes and materials indicated, with the following construction features:
 11. Expansion Anchors: 1/2"; approximately 38 pounds per 100 units.
 12. Toggle Bolts: Springhead; 3/16" x 4"; approximately 5 pounds per 100 units.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering anchors which may be incorporated in the work include, but are not limited to, the following:

Abbeon Cal Inc.
Ackerman Johnson Fastening Systems Inc.
Elcen Metal Products Co.
Ideal Industries, Inc.
Josliyn Mfg. nd Supply Co.
McGraw Edison Co.
Rewlplug Co. Inc.
Star Expansion Co.
U.S. Expansion Bolt Co.

PART 3 EXECUTION

3.01 INSTALLATION OF SUPPORTING DEVICES:

- A. Install hangers and anchors, as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements.
- B. Comply with requirements of NECA and NEC for installation of supporting devices.
- C. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.
- D. Install hangers, supports, clamps and attachments to support piping property from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with spacing indicated and in compliance with NEC requirements.

END OF SECTION

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-16 Basic Electrical Materials and Methods section apply to work specified in this section.

1.02 DESCRIPTION OF WORK:

- A. Electrical identification work is indicated by drawings and specifications.
- B. Types of electrical identification work specified in this section include the following:
 - 1. Electrical power and control conductors.
 - 2. Operational instructions and warnings.
 - 3. Equipment/system identification signs.
 - 4. Update panel board directories.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of electrical identification products of types required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing electrical identification work similar to that required for this project.
- C. NEC Compliance: Comply with NEC as applicable to installation of identifying labels and makers for wiring and equipment.
- D. UL Compliance: Comply with applicable requirements of UL Std 969, "Marking and Labeling Systems," pertaining to electrical identification systems.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Std No's WC-1 and WC-2 pertaining to identification of power and control conductors.

1.04 SUBMITTALS:

SECTION 16195 - ELECTRICAL IDENTIFICATION

- A. Product Data: Submit manufacturer's data on electrical identification materials and products.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering electrical identification products which may be incorporated in the work include, but are not limited to, the following:

Alarm Supply Co, Inc.
Brady, W.H. Co.
Calpico Inc.
Cole-Flax Corp.
Direct Safety Co.
George-Ingraham Corp.
Griffolyn Company.
Ideal Industries, Inc.
LEM Products, Inc.
Markal Company.
National Band and Tag Co.
Panduit Corp.
Radar Engineers Div.; EPIC Corp.
Seton Name Plate Co.
Tesa Corp.

2.02 ELECTRICAL IDENTIFICATION MATERIALS:

- A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.

B. Color-Coded Plastic Tape:

1. General: Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2" wide.
2. Color: Unless otherwise indicated or required by governing regulations, provide orange tape.

C. Safety Lock-out Tags

1. General: Manufacturer's standard pre-printed or partially preprinted accident-prevention and operational tags, of plasticized card stock with matt finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording, e.g., DANGER, CAUTION, DO NOT

SECTION 16195 - ELECTRICAL IDENTIFICATION

OPERATE.

D. Self-Adhesive Plastic Signs:

1. General: Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, PUMP, etc.
2. Color: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.

E. Engraved Plastic-Laminated Signs:

1. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core plies (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
2. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.
3. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.03 LETTERING AND GRAPHICS:

- A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

PART 3 EXECUTION

3.01 APPLICATION AND INSTALLATION:

A. General Installation Requirements:

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of NEC.
2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

SECTION 16195 - ELECTRICAL IDENTIFICATION

B. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

C. Conduit Identification:

1. General: Where electrical conduit is exposed in spaces with exposed mechanical piping which is identified by color-coded method, apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated, use white as coded color for conduit.

D. Operational Identification and Warnings:

1. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

E. Equipment/System Identification:

1. General: Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering, on 1-1/2" high sign (2" high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:

2. Panel boards and electrical cabinets.

F. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate. Provide updated typed directories inside panel boards and electrical cabinets affected by this project.

END OF SECTION

SECTION 16452 - GROUNDING AND BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. Division 16 Basic Materials and Methods sections apply to work of this section.
- C. Requirements of this section apply to electrical grounding and bonding work specified elsewhere in these specifications.

1.02 SUMMARY:

- A. Electrical grounding and bonding work is specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.
- B. Type of electrical grounding and bonding work specified in this section includes the following:
 - 1. Solidly grounded.
- C. Applications of electrical grounding and bonding work in this section includes the following:
 - 1. Electrical power systems.
 - 2. Raceways.
 - 3. Service equipment.
 - 4. Equipment.
- D. Refer to other Division 16 sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work; not work of this section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.
- B. Wiring Diagrams: Submit wiring diagrams for electrical grounding and bonding work which indicates layout of ground rings, location of system grounding electrode connections, routing of grounding electrode conductors, also include diagrams for circuits and equipment grounding connections.

1.04 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of

SECTION 16452 - GROUNDING AND BONDING

grounding and bonding products, of types, and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus, grounding electrodes and plate electrodes, and bonding jumpers whose products have been in satisfactory use in similar service for not less than 5 years.

- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with electrical grounding work similar to that required for project.
- C. Codes and Standards:
- D. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and 2014 NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.
- E. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869, "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Std 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL-listed and labeled for their intended usage.
- F. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141 and 142 pertaining to grounding and bonding of systems, circuits and equipment.

PART 2 PRODUCTS

2.01 ANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering grounding and bonding products which may be incorporated in the work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide grounding and bonding products of one of the following(for each type of product:

Adalet-PLM Div; Scott Fetzer Co.
Burndy Corporation.
Cadweld Div; Erico Products Inc.
Crouse-Hinds Div; Cooper Industries.
Eagle Electric Mfg Co.
Ideal Industries, Inc.
Joslyn Corporation.
Okonite Company.
OZ Gedney Div; General Signal Corp.

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Thomas and Betts Corp.

2.02 GROUNDING AND BONDING:

A. Materials and Components:

1. General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, solder less lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.

- B. Bonding Plates, Connectors, Terminals and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp manufacturers for indicated applications.

PART 3 EXECUTION

3.01 EXAMINATION:

- A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS:

- A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.
- B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.
- C. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage

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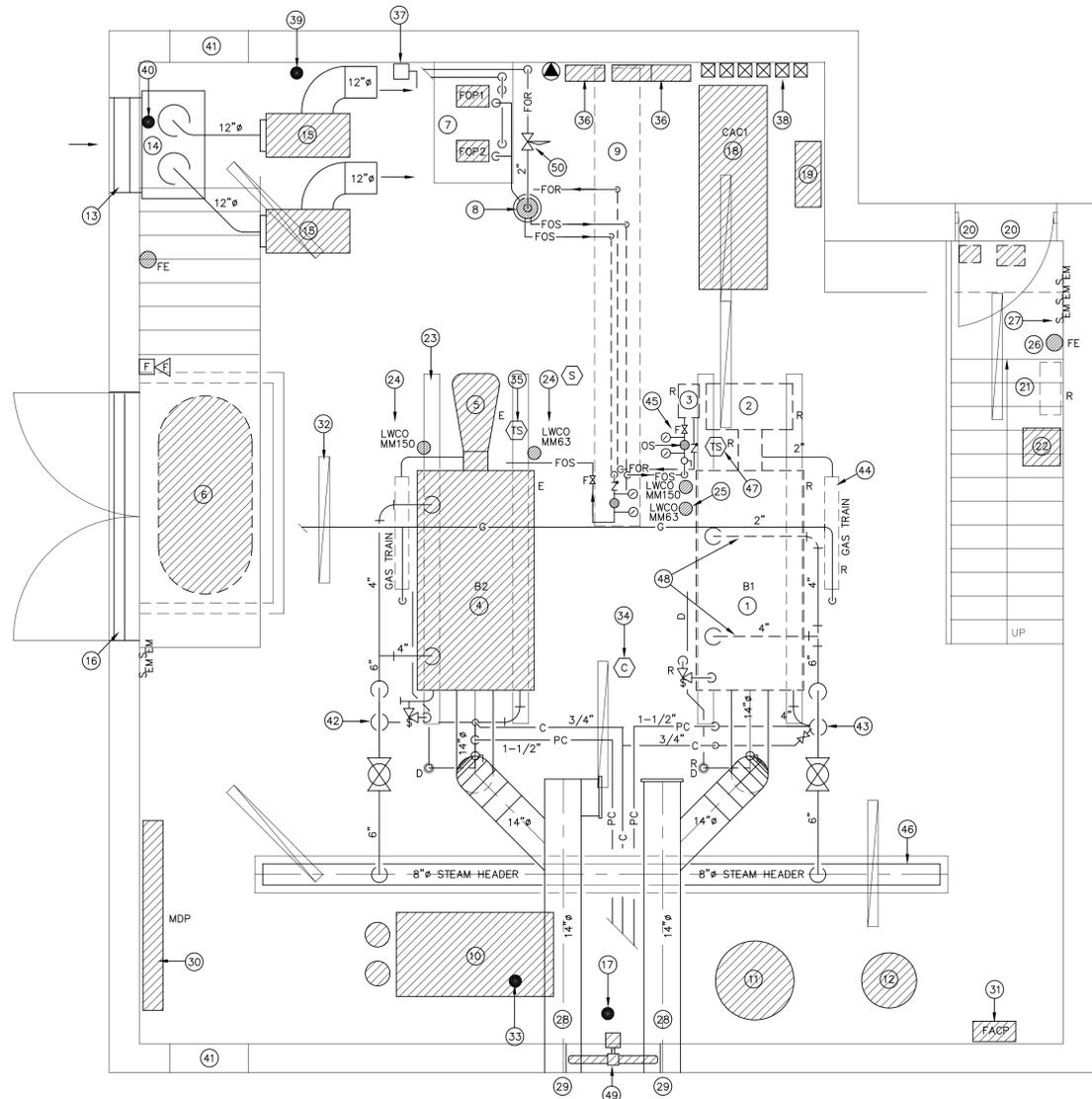
rises.

- D. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.
- E. Weld clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

3.03 FIELD QUALITY CONTROL:

- A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance.

END OF SECTION



BOILER ROOM - MECHANICAL DEMOLITION PLAN
SCALE: 3/8"=1'-0"

SCOPE OF WORK - MECHANICAL DEMOLITION

- DISCONNECT, REMOVE AND DISPOSE IN A LEGAL MANNER OF ALL EQUIPMENT, MATERIALS, ETC., AS INDICATED, SHOWN OR IMPLIED. DRAIN AND ISOLATE THE BOILER B1 AS REQUIRED TO PERFORM THIS DEMOLITION WORK. NOTE, THAT THERE IS EQUIPMENT INDICATED TO BE RE-USED OR TURNED OVER TO OWNER'S REPRESENTATIVE.
- THIS WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE 2016 CONNECTICUT STATE BUILDING AND FIRE SAFETY CODES, 2012 INTERNATIONAL BUILDING CODE, 2012 INTERNATIONAL MECHANICAL CODE, 2012 INTERNATIONAL PLUMBING CODE, 2014 NATIONAL ELECTRICAL CODE, 2012 INTERNATIONAL ENERGY CONSERVATION CODE, ANY OTHER APPLICABLE CODES, STANDARDS, REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF ALL LOCAL AUTHORITIES AND UTILITIES COMPANIES HAVING JURISDICTION.
- THIS CONTRACTOR SHALL PROVIDE A DETAILED SCHEDULE OF DEMOLITION WORK, REQUIRED FOR EACH INDIVIDUAL PIECE OF EQUIPMENT, COORDINATED WITH THE ANTICIPATED DELIVERIES OF THE NEW EQUIPMENT. THIS PROPOSED SCHEDULE OF DEMOLITION WORK SHALL BE APPROVED IN WRITING BY THE OWNER'S REPRESENTATIVE AND BY THE PROJECT ENGINEER, PRIOR TO STARTING ANY CONSTRUCTION WORK.
- IF THIS CONTRACTOR ENCOUNTERS IN HIS DEMOLITION WORK ANY SUSPECTED ASBESTOS MATERIALS, HIS/HER SHALL STOP WORK AND PROMPTLY REPORT THIS CONDITION TO THE PROJECT ENGINEER AND OWNER'S REPRESENTATIVE(S).
- THIS WORK SHALL BE PERFORMED DURING THE SUMMER RECESS OF 2018, AND REQUIRES TO BE COMPLETED NOT LATER THAN OCTOBER 1, 2018.
- DRAIN, DISCONNECT AND ISOLATE THE EXISTING BOILER/BURNER ASSEMBLY B1, ETC. DISASSEMBLE THIS EQUIPMENT, REMOVE AND DISPOSE OF IN A LEGAL MANNER UNLESS OTHERWISE INDICATED.
- DISCONNECT, REMOVE AND DISPOSE OF IN LEGAL MANNER OF EXISTING INDICATED VENTS AND BREECHINGS. HIRE THE SERVICES OF AN INDEPENDENT CERTIFIED CHIMNEY SWEEPER TO THOROUGHLY INSPECT AND CLEAN EXISTING CHIMNEY'S FLUES, PROVIDE THREE (3) COPIES OF THIS CHIMNEY REPORT TO THE PROJECT ENGINEER AT COMPLETION OF THE DEMOLITION WORK.
- CAREFULLY DRAIN, DISCONNECT EXISTING INDICATED FUEL OIL SUPPLY & RETURN PIPING, VALVES & OIL SPECIALTIES, SUPPORTS, ETC. AND PARTIALLY REMOVE TO THE EXTENT INDICATED, AND DISPOSE OF IN A LEGAL MANNER. COORDINATE WITH NEW FOS & R PIPING, AS INDICATED ON DRAWING M-1.
- CAREFULLY DISCONNECT EXISTING INDICATED GAS PIPING, GAS TRAINS, VALVES, REGULATORS, SUPPORTS, ETC., AND PARTIALLY REMOVE TO THE EXTENT INDICATED, AND DISPOSE OF IN A LEGAL MANNER.
- DRAIN, DISCONNECT EXISTING INDICATED COLD WATER, STEAM & STEAM CONDENSATE & PUMPED CONDENSATE, DRAIN PIPING, SUPPORTS, VALVES, ETC. TO THE EXTENT INDICATED AND REQUIRED, AND DISPOSE OF IN A LEGAL MANNER. TEMPORARILY ISOLATE AND CAP EXISTING PIPING DURING CONSTRUCTION WORK, AS TO PROTECT IT AGAINST ENTERING DUST & DEBRIS.
- DISCONNECT EXISTING UNUSED CONTROL PANELS, REMOVE THESE PANELS AND RELATED WIRING/CONDUITS, TO THE INDICATED AND REQUIRED, AND DISPOSE OF IN A LEGAL MANNER.
- TEMPORARILY IDENTIFY ALL CAPPED PIPING CONNECTIONS WITH PLASTIC MARKERS, AS TO CLEARLY EASE THE CONSTRUCTION WORK, REQUIRED TO BE PERFORMED LATER.
- THIS CONTRACTOR SHALL BE A CERTIFIED MECHANICAL CONTRACTOR IN THE STATE OF CONNECTICUT, SPECIALIZED IN THIS TYPE OF WORK. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CONSTRUCTION PERMITS, PAY ALL REQUIRED FEES, APPLICABLE TAXES, ETC., IF ANY, AND PERFORM ALL TESTS REQUESTED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.
- THIS DEMOLITION WORK SHALL BE DEEMED COMPLETE ONLY AFTER IS INSPECTED, AND APPROVED IN WRITING BY THE PROJECT ENGINEER AND OWNER'S REPRESENTATIVE.

DEMOLITION NOTES:

- EXISTING CAST IRON, LOW PRESSURE STEAM, DUAL FUEL BOILER B1, "H.B. SMITH", MODEL GOS2BA-S-10, RATED FOR 75 BHP, TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
- EXISTING BOILER B1 DUAL FUEL BURNER, "POWER FLAME", MODEL C2-GO-20B1, 1-1/2 HP MOTOR @ 208V/3 PH, TO BE DISCONNECTED, REMOVED AND TURNED OVER TO OWNER'S REPRESENTATIVE OR DISPOSED OF IN A LEGAL MANNER.
- EXISTING FUEL OIL PUMP TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
- EXISTING CAST IRON, LOW PRESSURE STEAM, DUAL FUEL BOILER B2, "WEIL McLAIN", SERIES 88, MODEL 1088, RATED FOR 73.2 BHP, TO REMAIN.
- EXISTING BOILER B2 DUAL FUEL BURNER, "RIELLO", MODEL RLS70.
- EXISTING 330 GALLONS FUEL OIL #2 HORIZONTAL STORAGE TANK IN CONTAINMENT DIKE ENCLOSURE, LOCATED BELOW LANDING PLATFORM, TO REMAIN.
- EXISTING FUEL OIL PUMPS FOP1 & 2, TO REMAIN.
- EXISTING 8" FUEL OIL STANDPIPE, TO REMAIN.
- EXISTING UTILITY TRENCH WITH COVER, TO REMAIN.
- EXISTING STEAM CONDENSATE BOILERS FEED SYSTEM, TO REMAIN.
- EXISTING GAS-FIRED DOMESTIC WATER HEATER, "A. O. SMITH", MODEL FSG-75, RATED FOR 75.1 MBH/CFH, 71 GALLONS CAPACITY & 125 GPH FIRST HOUR RECOVERY RATE, TO REMAIN.
- EXISTING ELECTRIC DOMESTIC WATER HEATER STORAGE TANK, "RHEEM", MODEL PRO-H50 12 RH05 ECI, 63 GALLONS CAPACITY, 21 GPH FIRST HOUR RECOVERY RATE, TO REMAIN.
- EXISTING COMBUSTION AIR LOUVER TO REMAIN.
- EXISTING 41"W x 48"H x 24" DEEP COMBUSTION AIR PLENUM TO REMAIN.
- EXISTING COMBUSTION AIR SUPPLY FAN, "TIERNLUND", MODEL PAI-7, RATED FOR 3,200 MBH/CFH TO REMAIN (TYP OF 2).
- EXISTING 72"W x 8"H x 4" DEEP COMBUSTION AIR LOUVER TO REMAIN.
- EXISTING BY-PASS FEEDER FOR CHEMICAL WATER TREATMENT TO REMAIN.
- EXISTING CONTROLS AIR COMPRESSOR CAC1 TO REMAIN.
- EXISTING "JOHNSON CONTROLS" CONTROL PANEL TO REMAIN.
- EXISTING "JOHNSON CONTROLS" METASYS CONTROL PANEL LOCATED ON WALL UNDER LANDING, TO REMAIN (TYP)
- EXISTING "ROBERT SHAW" ENERGY CONTROL PANEL TO BE DISCONNECTED, REMOVED & DISPOSED OF IN A LEGAL MANNER.
- EXISTING REFRIGERATED AIR DRYER TO REMAIN.
- EXISTING BOILER STEEL BEAM SUPPORT TO REMAIN (TYP).
- EXISTING BOILER LOW WATER CUTOFF CONTROL (LWCO) TO REMAIN (TYP).
- EXISTING BOILER LOW WATER CUTOFF CONTROL (LWCO) TO BE DISCONNECTED, REMOVED & DISPOSED OF IN A LEGAL MANNER (TYP).
- EXISTING FIRE EXTINGUISHER (FE) TO REMAIN (TYP).
- EXISTING EMERGENCY SHUTDOWN SWITCH TO REMAIN (TYP).
- EXISTING BREECHING, "METAL-FAB", MODEL PIC, TO REMAIN (TYP).
- EXISTING BREECHING TO CHIMNEY. HIRE THE SERVICES OF A LICENSED CHIMNEY SWEEPER ORGANIZATION TO INSPECT EXISTING CHIMNEY, THOROUGHLY CLEAN CHIMNEY, ALL BREECHINGS & VENTS, AND PROVIDE A WRITTEN REPORT AT THE COMPLETION OF THE DEMOLITION WORK.
- EXISTING 600 AMPS @ 208V/3 PH MAIN DISTRIBUTION PANEL (MDP) TO REMAIN.
- EXISTING FIRE ALARM CONTROL PANEL (FACP) TO REMAIN.
- EXISTING SUSPENDED FLUORESCENT LIGHTING FIXTURE TO REMAIN (TYP).
- EXISTING "ZURN" BACKFLOW PREVENTER OF 3/4" COLD WATER PIPING SERVING BOILERS B1 & 2.
- EXISTING CARBON MONOXIDE DETECTION/CONTROLLER CONNECTED TO THE FACP TO REMAIN.
- EXISTING THERMAL SWITCH TO REMAIN.
- EXISTING ELECTRICAL PANELBOARD TO REMAIN.
- EXISTING DISCONNECT SWITCH TO REMAIN.
- EXISTING EQUIPMENT STARTER TO REMAIN (TYP).
- EXISTING OLD TELEPHONE APPARATUS TO BE REMOVED.
- EXISTING UTILITY TRENCH WITH COVER, TO REMAIN.
- TUNNEL FIRE RATED ACCESS DOOR.
- HARTFORD LOOP WITH END OF LINE INVERTED STEAM TRAP TO REMAIN.
- HARTFORD LOOP WITH END OF LINE INVERTED STEAM TRAP TO BE TEMPORARILY DISCONNECTED.
- EXISTING GAS TRAIN TO BE DISCONNECTED, REMOVED AND DISPOSED IN A LEGAL MANNER.
- EXISTING FOS & R PIPING TO BE DISCONNECTED DURING THE REMOVAL OF THIS BOILER.
- EXISTING LOW PRESSURE STEAM HEADER TO REMAIN.
- EXISTING THERMAL SWITCH TO BE REMOVED. REFER TO DRAWING DE-1
- DISCONNECT, REMOVE AND DISPOSE OF IN A LEGAL MANNER OF EXISTING LPS TO THE EXTENT SHOWN AND REQUIRED.
- EXISTING PROPELLER EXHAUST FAN HIGH ON WALL TO REMAIN.
- FUEL OIL PRESSURE RELIEF VALVE TO REMAIN.

LEGEND AND ABBREVIATIONS

---	EXISTING EQUIPMENT/DUCTWORK/PIPING TO REMAIN (E)
---	EXISTING EQUIPMENT/DUCTWORK/PIPING TO BE REMOVED (R)
---	NEW DUCTWORK/PIPING/EQUIPMENT
B#	BOILER
BCP#	BOILERS CONTROL PANEL
CAC#	CONTROLS AIR COMPRESSOR
G	GAS PIPING
FOS/R	FUEL OIL SUPPLY/RETURN PIPING
LPS/R	LOW PRESSURE STEAM RETURN PIPING
PC	PUMP CONDENSATE
FD	FLOOR DRAIN
D	DRAIN PIPING
C	COLD WATER PIPING
LWCO	LOW WATER CUTOFF
FACP	FIRE ALARM CONTROL PANEL
FG#	FUEL GAS AND TEMPERATURE MONITOR AND CUTOFF
MM#	McDONNELL MILLER LWCO
S	SWITCH, LIGHTING
SS	SERVICE SWITCH
SEM	EMERGENCY SHUTDOWN SWITCH
T	THERMOSTAT/TEMPERATURE SENSOR
⊙	CARBON MONOXIDE DETECTION/CONTROLLER
⊙	THERMAL SWITCH
⊙	FIRE EXTINGUISHER
⊙	EXIT SIGN
⊙	EMERGENCY LIGHT, SELF-CONTAINED
⊙	DISCONNECT SWITCH
⊙	EQUIPMENT STARTER
⊙	FIRE ALARM PULL STATION
⊙	FIRE ALARM COMBINATION HORN/STROBE
⊙	BALL VALVE
⊙	FUSOMATIC VALVE
⊙	PRESSURE GAUGE
⊙	THERMOMETER
⊙	OIL STRAINER
⊙	SAFETY VALVE
⊙	PRESSURE SENSOR
⊙	TEMPERATURE SENSOR
⊙	EXISTING TO REMAIN
⊙	EXISTING TO BE RELOCATED
⊙	EXISTING TO BE REMOVED

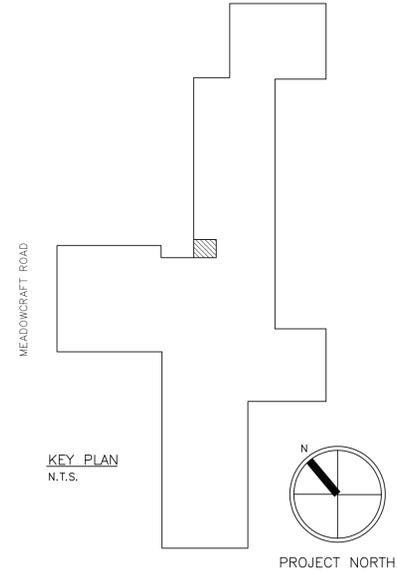
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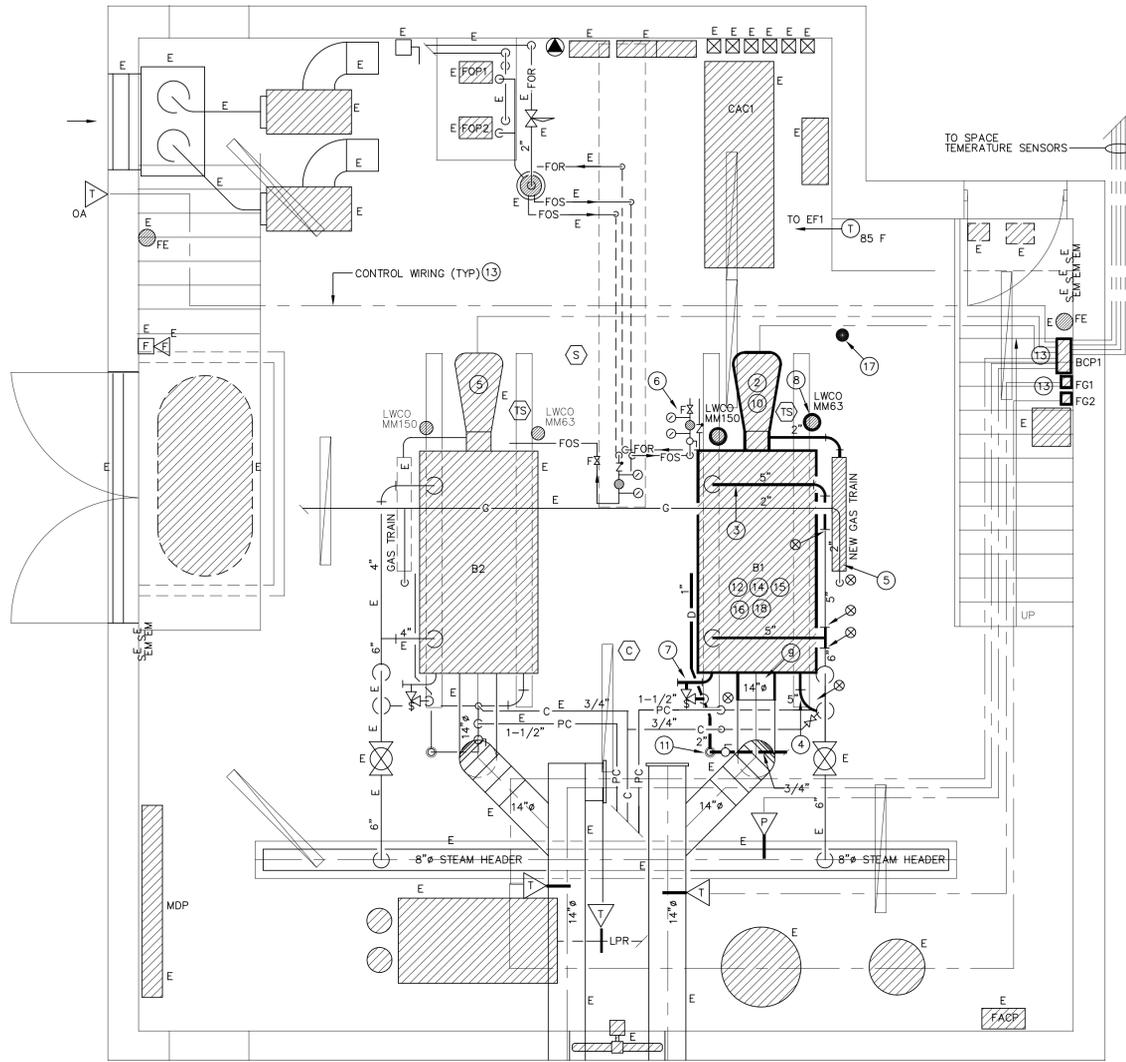
Project Engineer:
DUMITRU T. PETRESCU, P.E., LLC
Mechanical & Electrical Consulting Engineers
567 Raycoe Terrace, Hamden, CT 06514-1008
(203) 287-9995

CONTRACTOR:
TOWN OF FAIRFIELD
FAIRFIELD PUBLIC SCHOOLS
PROJECT ADDRESS
BOILER REPLACEMENT AT
HOLLAND HILL E.S.
105 MEADOWCRAFT ROAD, FAIRFIELD, CT
BID #2018-68
SHEET DESCRIPTION
BOILER ROOM - MECHANICAL DEMOLITION PLAN



- GENERAL NOTES**
- THE INFORMATION SHOWN ON THIS DRAWING IS BASED UPON THE INFORMATION SHOWN ON THE BUILDING PLANS AND LIMITED FIELD INVESTIGATIONS AND MAY OR MAY NOT REFLECT ACTUAL FIELD CONDITIONS. THIS CONTRACTOR SHALL VERIFY THE INFORMATION INDICATED ON THIS DRAWING AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO SUBMITTING HIS BID.
 - THIS CONTRACTOR IS REQUIRED TO PERFORM THIS WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, ORDINANCES, ETC., AND TO MEET THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND OWNER, WHETHER OR NOT SPECIFICALLY INDICATED OR SPECIFIED ON THIS DRAWING.
 - ALL PENETRATIONS THRU FLOOR AND WALLS SHALL BE FIRE STOPPED WITH "THOMAS AND BETTS" - FLAMESAFE, TYPE FST FIRESTOP COMPOUND OR APPROVED EQUIVALENT, CONFORMING TO ASME E814/JUL1479.

drawn by	CP
scale	NOTED
date	MARCH, 2018
checked by	DTP
project number	DTP18012
drawing number	DM-1



BOILER ROOM - MECHANICAL FLOOR PLAN
SCALE: 3/8"=1'-0"

SEQUENCE OF OPERATION

BOILER/BURNER ASSEMBLIES

THE LEAD BOILER/BURNER ASSEMBLY SHALL BE ENERGIZED VIA THE BOILER CONTROL PANEL BC1, BASED ON THE READINGS OF THE (1) OUTSIDE AND (4) SPACE TEMPERATURE SENSORS. PLACE THESE SPACE TEMPERATURE SENSORS IN STRATEGIC SPACES LOCATED FURTHEST AWAY FROM THE BOILER ROOM, AS TO ENSURE THAT THEY WILL RECEIVE ADEQUATE HEAT WHEN STEAM PRESSURE IS RESET BASED ON OUTSIDE AIR TEMPERATURE. PLACE THE OUTDOOR AIR TEMPERATURE SENSOR ON THE OUTSIDE WALL OF THE BOILER ROOM, WHERE SHOWN ON THIS DRAWING. PROVIDE SUN & WEATHER SHIELD FOR THIS SENSOR. PLACE THE STEAM PRESSURE SENSOR ON THE STEAM HEADER AND THE LOW PRESSURE STEAM RETURN TEMPERATURE SENSOR, WHERE SHOWN ON THIS DRAWING. THE EXISTING COMBUSTION AIR FAN #1 SHALL BE ENERGIZED VIA ITS INTERLOCK WITH THIS LEAD BOILER. IF THIS COMBUSTION AIR FAN FAILS TO START, THE EXISTING COMBUSTION AIR FAN #2 SHALL START VIA ITS INTERLOCK WITH THIS LEAD BOILER. IF ANY OR BOTH EXISTING COMBUSTION AIR FANS FAIL TO START, ALARMS SHALL BE GENERATED AT THE BOILER CONTROL PANEL BC1, AND FURTHER THESE ALARMS SHALL BE SENT TO THE EXISTING "JOHNSON CONTROLS" ENERGY MANAGEMENT SYSTEM (EMS), AND THE LEAD BOILER SHALL SHUT DOWN. IF THE EXISTING COMBUSTION AIR FANS OPERATE AS REQUIRED, THE LEAD BOILER SHALL GO THROUGH ITS FIRING LOW/HIGH/LOW, AS REQUIRED TO SATISFY THE TEMPERATURE SETTINGS OF THE (4) SPACE TEMPERATURE SENSORS ABOVE INDICATED. IF ALL THE TEMPERATURE SETTINGS OF THESE SENSORS ARE SATISFIED, THIS LEAD BOILER SHALL OPERATE FOR 24 HOURS, BEFORE IT IS SHUT DOWN AND THE LAG BOILER IS ENERGIZED IN THE SAME MANNER ABOVE INDICATED. IF THE TEMPERATURE SETTINGS OF ANY OF THESE SENSORS IS NOT SATISFIED, THE LAG BOILER SHALL BE ENERGIZED AS REQUIRED. THE BOILERS OPERATION SHALL ALTERNATE FOR EVEN USAGE. SET THE SPACE TEMPERATURE SENSORS SETTING AT 70 F DURING THE OCCUPIED HOURS AND 55 F (I.E. ADJUSTABLE) FOR RESULTS IN HEATING THE SCHOOL BEFORE IS GETTING OCCUPIED EVERY MORNING, BY THE BOILER CONTROL PANEL ANTICIPATION FEATURE. IF THE STEAM PRESSURE OR THE LOW PRESSURE RETURN TEMPERATURE FALLS BELOW ITS SETTING, AND ALARM SHALL BE GENERATED AT THE BOILER CONTROL PANEL BC1 AND THESE ALARMS SHALL BE SENT FURTHER TO THE EXISTING EMS. THE LEAD BOILER SHALL BE ENERGIZED ANY TIME THE OUTSIDE AIR TEMPERATURE FALLS BELOW 65 F (I.E. ADJUSTABLE) AND ANY SPACE TEMPERATURE SENSOR SETTING FALLS BELOW 70 F DURING OCCUPIED HOURS. THE STEAM PRESSURE SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE IN SUCH A MANNER AS TO ENSURE HEAT IS PROVIDED TO THE FURTHEST LOCATED SPACES FROM THE BOILER ROOM, FOR EXAMPLE 5 PSI @ 0 F AND 2 PSI @ 65 F OUTDOOR AIR TEMPERATURE (I.E. ADJUSTABLE). THE BOILER CONTROL BC1 OPERATION HAS A BYPASS FEATURE, AS REQUIRED FOR MAINTENANCE. IF ANY BOILER/BURNER ASSEMBLY FAILS TO ENERGIZE, AN ALARM SHALL BE SENT TO THE BOILER CONTROL PANEL BC1 AND FURTHER AN ALARM SHALL BE SENT TO THE EXISTING EMS. IF ANY BREACHING TEMPERATURE EQUALS OR EXCEEDS THE TEMPERATURE SETTING, A VISUAL/AUDIBLE ALARM SHALL BE GENERATED BY ANY FLUE GAS TEMPERATURE MONITOR & CUTOFF, AND A SIGNAL SHALL BE SENT TO THE BOILER CONTROL PANEL BC1 AND FURTHER TO THE EXISTING EMS. IF ANY THERMAL SWITCH EXCEEDS ITS FACTORY SETTING (135 F), ANY BOILER/BURNER ASSEMBLY SHALL BE SHUT DOWN, AN ALARM SHALL BE SENT TO THE BOILER CONTROL PANEL BC1 AND FURTHER TO THE EXISTING EMS. IF THERE IS AN EMERGENCY CONDITION IN THE BOILER ROOM TO ANY BOILER/BURNER ASSEMBLY, THIS BOILER WILL MANUALLY BE SHUT DOWN FROM ITS EMERGENCY SHUT DOWN SWITCH, AN ALARM SHALL BE GENERATED AT THE BOILER CONTROL PANEL BC1 AND FURTHER A SIGNAL SHALL BE SENT TO EXISTING EMS. IF SMOKE IS DETECTED IN THE BOILER ROOM, BOTH BOILERS WILL BE SHUTDOWN, AN ALARM SHALL BE GENERATED BY THE FIRE ALARM CONTROL PANEL AND BOILER CONTROL PANEL, A VISUAL/AUDIBLE ALARM SHALL BE GENERATED AND FURTHER A SIGNAL SHALL BE SENT TO THE EXISTING EMS. IF CARBON MONOXIDE IS DETECTED IN THE BOILER ROOM, BOTH BOILERS WILL BE SHUTDOWN, AN ALARM SHALL BE GENERATED BY THE FIRE ALARM CONTROL PANEL AND BOILER CONTROL PANEL, A VISUAL/AUDIBLE ALARM SHALL BE GENERATED AND FURTHER A SIGNAL SHALL BE SENT TO THE EXISTING EMS. **PROPELLER EXHAUST FAN** THE EXISTING PROPELLER EXHAUST FAN SHALL BE ENERGIZED VIA A LINE VOLTAGE THERMOSTAT ANY TIME THE BOILER ROOM TEMPERATURE EXCEEDS 85 F (I.E. ADJUSTABLE).

CONSTRUCTION NOTES:

- NEW CAST IRON, LOW PRESSURE STEAM BOILER ASSEMBLY, AS SPECIFIED ON THIS DRAWING, SEISMICALLY ANCHOR THE BOILER ASSEMBLY TO EXISTING STEEL SUPPORTS, AS REQUIRED.
- NEW BOILER #1 DUAL FUEL BURNER AS SPECIFIED ON THIS DRAWING, SEISMICALLY SUPPORT THE NEW BURNER TO THE EXISTING CONCRETE SLAB.
- NEW 5" LOW PRESSURE STEAM PIPING TO BE CONNECTED TO EXISTING LPS PIPING, AS REQUIRED (TYP OF 2).
- CONNECT THE EXISTING 5" HARTFORD LOOP TO NEW BOILER B1. RE-CONNECT EXISTING PUMPED CONDENSATE (PC), COLD WATER (C) MAKE-UP WATER, AND EQUALIZER PIPING AS REQUIRED FOR A COMPLETE OPERATIONAL SYSTEM.
- NEW "GE" APPROVED GAS TRAIN, AS REQUIRED, CONNECT THE NEW GAS TRAIN TO EXISTING 2" GAS PIPING AND EXTEND THIS PIPING TO THE NEW BOILER/BURNER B1, AS REQUIRED, SEISMICALLY SUPPORT THE NEW GAS TRAIN TO THE EXISTING CONCRETE SLAB.
- EXISTING FUEL OIL #2 PIPING TO BE EXTENDED TO THE NEW BURNER LOCATION. MAKE THE FINAL CONNECTIONS TO THE NEW BURNER WITH APPROVED FLEXIBLE CONNECTORS NOT TO EXCEED 1'-0" IN TOTAL LENGTH. REPLACE EXISTING FUSOMATIC VALVES, BALL VALVE, GAUGES AND OIL STRAINER. THE NEW OIL STRAINER SHALL HAVE A CAPACITY OF MINIMUM 2.5 TIMES THE BURNER FITTING RATE. PROVIDE NEW STEAM/FILTER, AS REQUIRED.
- INSTALL THE NEW 2" BOILER/BURNER B1 SAFETY VALVE AND PIPE WITH 2" INTO THE NEW DRAIN PIPING, AS REQUIRED.
- INSTALL THE NEW BOILER/BURNER B1 OPERATING & SAFETY CONTROLS, IN STRICT ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY.
- PROVIDE NEW 14" VENT CONNECTOR TO MATCH EXISTING, AND CONNECT TO EXISTING, AS REQUIRED.
- COORDINATE THE NEW BOILER/BURNER B1 POWER REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR AND ENERGIZE THIS BOILER, AS REQUIRED.
- COMPLETE DRAIN & BLOWDOWN PIPING FOR THE NEW BOILER/BURNER ASSEMBLY B1, AS REQUIRED.
- PERFORM HYDRAULIC TESTING OF THE BOILER B1 SECTIONS ASSEMBLY @ 50 PSI FOR 24 HOURS, AS REQUIRED. PROVIDE ANY NECESSARY ADJUSTMENTS INCLUDING THE REPLACEMENT OF ANY FOUND LEAKING CAST IRON SECTIONS.
- INSTALL THE NEW BOILER CONTROL PANEL BC1, FLUE GAS TEMPERATURE MONITORS & CUTOFFS FG1 & 2, SENSORS, WIRING/CONDUITS, ETC., AND PROVIDE SOFTWARE, PROGRAMMING AND DEMONSTRATION TO THE OWNER'S PERSONNEL, AS REQUIRED.
- PROVIDE START-UP OF THE NEW BOILER/BURNER B1 IN THE PRESENCE OF THE FACTORY REPRESENTATIVE, IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY. PROVIDE CHEMICAL WATER TREATMENT FROM THE EXISTING CHEMICAL WATER TREATMENT SYSTEM AND ENSURE THAT THE BLOWDOWN MEETS THE STATE OF CONNECTICUT, DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP), AS REQUIRED. PROVIDE A WRITTEN START-UP REPORT FOR REVIEW BY THE PROJECT ENGINEER, CERTIFY THE NEW BOILER/BURNER ASSEMBLY INSTALLATION, AND PROVIDE WRITTEN WARRANTY FOR SAME.
- CHECK TO SEE IF ALL EXISTING VALVES (STEAM, PUMPED CONDENSATE & MAKE-UP WATER) LOCATED WITHIN THIS BOILER ROOM HOLD UNDER PRESSURE, AND FURTHER PROVIDE WITH YOUR BID THE COST OF REPLACEMENT BASED ON THE UNIT SCHEDULE, BELOW INDICATED:
 - 3/4" - 1-1/2" - 3" - 6"
 - 1" - 2" - 4" - 8"
 - 1-1/4" - 2-1/2" - 5"
- AFTER THE REPLACEMENT OF THESE VALVES, PROVIDE A WALL MOUNTED "FRAMED VALVE CHART", INDICATING WITH BRONZE VALVE TAGS ALL VALVES LOCATED WITHIN THE BOILER ROOM, MARKED-UP THE DATES THE REPLACED VALVES.
- INSTALL THE NEW BOILER INSULATED JACKET, AND PROVIDE PIPING & FITTINGS INSULATION, LOCAL EXHAUST FAN CONTROL, PAINTING WORK, ETC. AND FINAL CLEANING, AS REQUIRED TO COMPLETE THIS WORK.
- FURNISH & INSTALL UL LISTED 1-1/2 HOUR RATED FIRE DAMPERS TYPE "B" (WITH CURTAINS OUTSIDE AIR STREAM) ON THE EXISTING EXHAUST FAN DUCTWORK WHICH PENETRATES THE BOILER ROOM FIRE RATED WALLS, PROVIDE 8"X8" MINIMUM SIZE HINGED TYPE ACCESS DOORS, AS REQUIRED FOR SERVICE.
- COORDINATE WITH LOCAL AUTHORITIES HAVING JURISDICTION THE FINAL INSPECTION. PROVIDE ALL NECESSARY ADJUSTMENT AND OBTAIN A CERTIFICATE OF OCCUPANCY (CO).

EQUIPMENT SELECTION

BOILERS

B1
BOILER, LOW PRESSURE CAST IRON TYPE, EQUAL TO "WEIL MCLAIN", 88 SERIES 2 COMMERCIAL BOILER MODEL BGL-1098SF, RATED FOR 76.5 BHP I=B=R, 3,092 MBH/CFH I=B=R MAXIMUM GAS INPUT FIRING RATE @ 7.5" W.C. MINIMUM GAS PRESSURE WITH 83.6% COMBUSTION EFFICIENCY & 83.1% THERMAL EFFICIENCY, 21.5 GPH I=B=R MAXIMUM FUEL OIL#2 FIRING RATE WITH 86.2% COMBUSTION EFFICIENCY & 85.6% THERMAL EFFICIENCY, 2,561 MBH I=B=R GROSS OUTPUT, 1,988 MBH I=B=R NET HEATING OUTPUT & 8,283 SQFT NET I=B=R RATING, 14" Ø FLUE OUTLET, 247 GALLONS WATER CONTENT, 82-3/4" x 44-3/4" W x 65" H, 6,130 LBS APPROX. SHIPPING WEIGHT, FURNISHED WITH DUAL FUEL BURNER, EQUAL TO "RIELLO", MODEL RL100, RATED FOR 3,103 MBH CFH GAS INPUT, 21.5 GPH FUEL OIL #2 FIRING RATE, LOW/HIGH/LOW FIRING SEQUENCE, 3 HP MOTOR @ 208V/3 PH, 45.75" L x 28.88" W x 12.75" H, 165 LBS OPERATING WEIGHT, ASME, AHRI, AND SA CERTIFIED. THE BOILER TAPPING ARE, AS FOLLOW: (2) 5" LOW PRESSURE STEAM SUPPLY, (2) LOW PRESSURE STEAM RETURN, 14" FLUE GAS VENT, (2) 2" SAFETY VALVE/SKIM TAPPINGS, (1) SECONDARY PROBE LWCO, (2) 1" LOW WATER CUTOFFS, (2) 1" ALTERNATE LOW WATER CUTOFFS, (2) 1/2" GAUGE GLASS, (2) 3/8" TRY COCK, 3/4" PRESSURE LIMIT CONTROL, PRESSURE OPERATING CONTROL AND PRESSURE GAUGE, 3/4" BOILER DRAIN AND 2" BLOWDOWN/DRAIN WITH 1-1/4" MINIMUM BLOWOFF VALVE SIZE.

NOTES:

- THE BOILER'S SECTIONS SHALL BE FIELD ERRECTED, HYDRAULICALLY TESTED AT 50 PSI FOR 24 HOURS, IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY. REMOVE AND REPLACE ANY FAILED SECTION(S), AS REQUIRED.
- CONNECT LOW PRESSURE STEAM & RETURN, PUMP CONDENSATE, DRAIN & BLOWDOWN, GAS & FUEL OIL PIPING, INSTALL THE STEAM BOILER CONTROLS, AND CONNECT THE BOILER'S VENT, AS INDICATED, IMPLIED AND REQUIRED FOR COMPLETE OPERATIONAL SYSTEMS. TEST THE NEW STEAM BOILER OPERATION BOTH USING NATURAL GAS & FUEL OIL #2, AND PROVIDE ALL NECESSARY ADJUSTMENTS, IN THE PRESENCE OF THE FACTORY REPRESENTATIVE AND OWNER'S PERSONNEL. THE FACTORY REPRESENTATIVE SHALL PROVIDE A WRITTEN REPORT AND CERTIFY THIS INSTALLATION, AS REQUIRED. THE BOILER/BURNER ASSEMBLY WARRANTY SHALL START UPON THIS WRITTEN CERTIFICATION AND ITS APPROVAL BY THE PROJECT ENGINEER.
- PROVIDE DEMONSTRATION AND INSTRUCT THE OWNER'S PERSONNEL IN OPERATING THIS NEW STEAM BOILER FOR AT LEAST (4) HOURS.
- SEISMICALLY ANCHOR THIS NEW BOILER TO EXISTING STEEL BEAMS IN AN ACCEPTABLE MANNER AS TO ALLOW THE BOILERS SECTION EXPANSION & CONTRACTION, APPROVED BY A LICENSED STRUCTURAL ENGINEER.
- THE EXISTING & NEW STEAM BOILERS SHALL OPERATE FROM THE LOCAL BOILERS CONTROL PANEL BC1 AND SHALL BE FULLY MONITORED BY THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM. REFER TO SPECIFICATIONS.
- THIS BOILER SERVICE SWITCH SHALL BE WIRED IN SERIES WITH A THERMAL SWITCH AND AN EMERGENCY SHUTDOWN SWITCH BY THE ELECTRICAL CONTRACTOR.

BOILERS CONTROL PANEL

BC1
BOILERS CONTROL PANEL SHALL BE EQUAL TO "HEAT TIMER", MODEL MPC PLATINUM, CAPABLE OF LEAD/LAG CONTROL, BUILT-IN OUTDOOR RESET, ADJUSTABLE SYSTEM RUN-ON DELAY, DAY/NIGHT MODES, SUMMER/WINTER SWITCH, FURNISHED WITH REMOTE COMMUNICATION AND BACnet INTERFACE WITH THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM, 30 WATTS @ 120V/1 PH, UL LISTED.

NOTES:

- INSTALL THE BOILERS CONTROL PANEL IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY.
- THE BOILER'S CONTROL PANEL SHALL FULLY CONTROL THE OPERATION OF THE STEAM BOILER ASSEMBLIES B1 & 2.
- THE BOILERS CONTROL PANEL SHALL BE FULLY MONITORED BY THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM. PROVIDE ALL NECESSARY CONTROLLERS, SENSORS, RELAYS, WIRING/CONDUITS, SOFTWARE, PROGRAMMING, ETC., AS REQUIRED FOR A FULLY OPERATIONAL SYSTEM.

FLUE GAS TEMPERATURE MONITORS & CUTOFFS

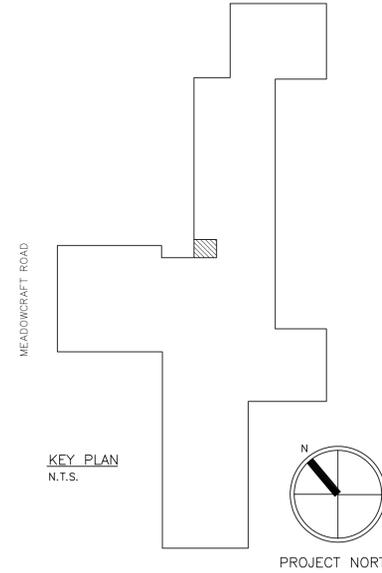
FG1 & 2
FLUE GAS TEMPERATURE MONITOR & CUTOFF SHALL BE EQUAL "PREFERRED UTILITIES MANUFACTURING CORPORATION", MODEL JC-150, FURNISHED WITH NUMERIC LED DISPLAY WITH MENUS FOR LOW BOILERS EFFICIENCY ALARM MESSAGE AND CONTACT, BURNERS SHUTDOWN CONTACTS AND MESSAGE, AND PROVIDE ALL NECESSARY TYPE J THERMOCOUPLES, WIRING/CONDUITS, LOCAL AUDIO VISUAL ALARM, FLEXIBLE COMMUNICATIONS AND DATA LOGGING, 15 WATTS @ 120V/1 PH, UL LISTED, AND INTERFACE WITH THE EXISTING "JOHNSON CONTROLS" METASYS ENERGY MANAGEMENT SYSTEM (EMS).

NOTES:

- INSTALL THE FLUE GAS TEMPERATURE MONITORS & CUTOFFS IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY.
- PROVIDE ALL NECESSARY CONTROLLERS, SENSORS, RELAYS, WIRING/CONDUITS, SOFTWARE, PROGRAMMING, ETC., AS REQUIRED FOR A FULLY OPERATIONAL SYSTEM, AS NECESSARY TO INTERFACE WITH THE EXISTING EMS.

SCOPE OF WORK - NEW WORK

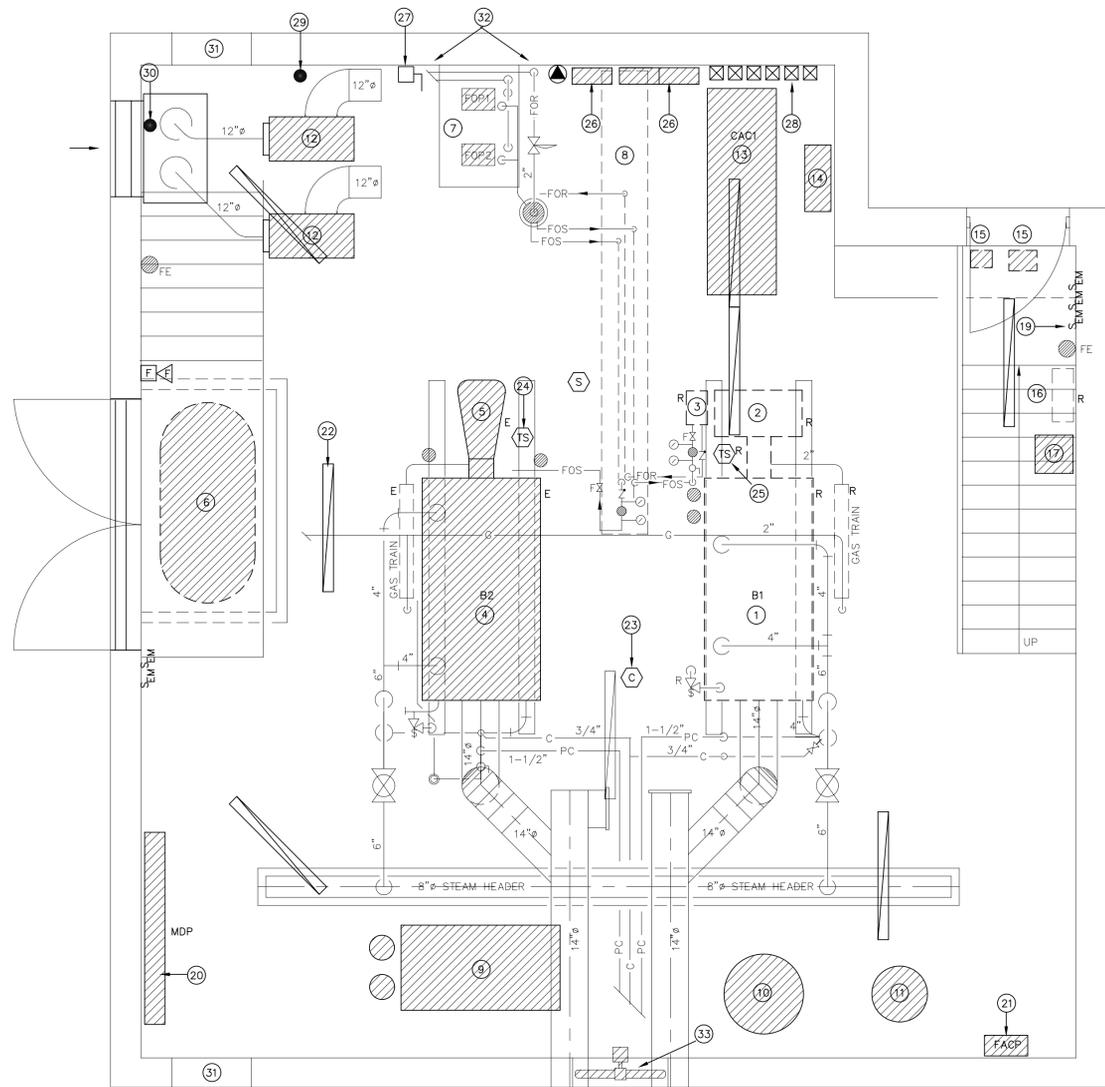
- ALL POTENTIAL CONTRACTORS SHALL BECOME FAMILIAR WITH THE EXISTING CONDITIONS, PRIOR TO START ANY WORK.
- ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE 2016 CONNECTICUT STATE BUILDING AND FIRE SAFETY CODES, 2012 INTERNATIONAL MECHANICAL CODE, 2012 INTERNATIONAL PLUMBING CODE, 2012 INTERNATIONAL ENERGY CONSERVATION CODE, 2014 NATIONAL ELECTRIC CODE, OTHER APPLICABLE CODES, STANDARDS, REGULATIONS, ORDINANCE, ETC., AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES AND UTILITIES COMPANIES HAVING JURISDICTION. THIS CONTRACTOR SHALL BE A LICENSED MECHANICAL CONTRACTOR AND SHALL BE RESPONSIBLE TO OBTAIN A CONSTRUCTION PERMIT AND PAY FOR ALL APPLICABLE FEES, TAXES, TESTS, ETC. NO WORK SHALL BE PERFORMED UNTIL SHOP DRAWINGS FOR EACH MECHANICAL EQUIPMENT, STAMPED & SIGNED BY A STRUCTURAL PROFESSIONAL ENGINEER, AND FURTHER OBTAIN ALL NECESSARY APPROVALS FROM THE PROJECT ENGINEER AND OWNER'S REPRESENTATIVE(S), PRIOR TO INSTALLING THESE ITEMS.
- FURNISH & INSTALL ALL EQUIPMENT, DEVICES, MATERIALS, ETC., AND PROVIDE ALL NECESSARY LABOR, RIGGING, ETC. AS INDICATED, SHOWN OR SPECIFIED FOR COMPLETE OPERATIONAL SYSTEMS, APPROVED IN WRITING BY THE PROJECT ENGINEER & OWNER'S REPRESENTATIVE, AND LOCAL AUTHORITIES HAVING JURISDICTION.
- ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY, WITH ALL REQUIRED CLEARANCES FOR MAINTENANCE AND SERVICE.
- ALL FLOORS AND WALLS PENETRATIONS SHALL BE SEALED IN ACCORDANCE WITH 2012 IBC, SEC. 714, WITH APPROVED FIRE STOPPING MATERIALS, AS REQUIRED.
- ALL MECHANICAL EQUIPMENT SHALL BE SEISMICALLY RESTRAINT TO THE BUILDING STRUCTURAL ELEMENTS, AS REQUIRED, BY THE 2012 INTERNATIONAL BUILDING CODE, SECTION 1613. REFER TO 1999 ASHRAE "A PRACTICAL GUIDE TO SEISMIC RESTRAINT" THE SEISMIC RESTRAINTS MANUFACTURERS' ARE REQUIRED TO PROVIDE CERTIFIED SHOP DRAWINGS FOR EACH MECHANICAL EQUIPMENT, STAMPED & SIGNED BY A STRUCTURAL PROFESSIONAL ENGINEER, AND FURTHER OBTAIN ALL NECESSARY APPROVALS FROM THE PROJECT ENGINEER AND OWNER'S REPRESENTATIVE(S), PRIOR TO INSTALLING THESE ITEMS.
- THE NEW BOILER B1 SHALL BE DELIVERED TO SITE KNOCKDOWN, SHALL BE FULLY ASSEMBLED AT SITE, AND FURTHER HYDRAULICALLY PRESSURE AND GFAS/OIL FIRING TESTED, AS INDICATED IN SECTION 15556.
- THE NATURAL GAS PIPING ABOVE GRADE SHALL BE STEEL, ASTM A53 OR A120, SCHEDULE 40, BLACK, WITH MALLEABLE IRON FITTINGS ASME B16.3 (UP TO AND INCLUDING 2") AND FORGED STEEL ASTM A234 (ABOVE 2") WITH THREADED JOINTS (UP TO AND INCLUDING 2") AND WELDED JOINTS (ABOVE 2") ANSI B31.1, B31.2 & B31.9. FLANGES, UNIONS AND COUPLING 2" AND UNDER SHALL BE FERROUS PIPE, MALLEABLE IRON WITH THREADED UNIONS, RATED FOR 150 PSI. ON PIPING OVER 2" USE FORGED STEEL SLIP ON FLANGES, 1/16" THICK PRE-FORMED NEOPRENE GASKETS, PLUG VALVES UP TO AND INCLUDING 2" BRONZE BODY, BRONZE SAFERED FLUE, NON-LUBRICATING, TEFLON PACKING, THREADED ENDS, OVER 2" USE CAST IRON BODY AND PLUG, NON-LUBRICATED, TEFLON PACKING, FLANGED ENDS. USE DIELECTRIC UNIONS WHEN DISSIMILAR MATERIALS ARE JOINED TOGETHER. ALL SUPPORTS AND ANCHORS SHALL BE CONFORMING WITH ASME B31.9, AND MSS SP58, 69 & 89. COVER ALL GAS PIPING WITH (1) LAYER OF PRIMER AND (2) COATS OF YELLOW WEATHER RESISTANT PAINT AND IDENTIFY GAS PIPING WITH ANSI APPROVED TYPE PLASTIC MARKERS.
- THE FUEL OIL PIPING ABOVE GRADE SHALL BE COPPER TUBING ASTM B88, TYPE K HARD DRAWN, WITH CAST BRONZE FITTINGS ASME B16.16, AND BCU SILVER BRAZED JOINTS NFA-30, OR STEEL PIPE ASTM A53, SCHEDULE 40, WITH ASTM B16.3 MALLEABLE IRON FITTINGS ASME B16.3 AND NFA-30 THREADED JOINTS. FUEL OIL SPECIALTIES, SUCH AS OIL STRAINERS, FUSOMATIC VALVES, ETC., AS REQUIRED FOR A COMPLETE OPERATIONAL INSTALLATION.
- THE STEAM HOT WATER HEATING PIPING ABOVE GRADE SHALL BE STEEL, ASTM A53, SCHEDULE 40, BLACK, WITH MALLEABLE IRON FITTINGS ASME B16.3 (UP TO AND INCLUDING 2") AND FORGED STEEL ASTM A234 (ABOVE 2") WITH THREADED JOINTS (UP TO AND INCLUDING 2") AND WELDED JOINTS (ABOVE 2") ANSI B31.1, B31.2 & B31.9 OR MECHANICAL JOINTS. THE STEAM CONDENSATE PIPING ABOVE GRADE SHALL BE STEEL, ASTM A53, SCHEDULE 80, BLACK, WITH MALLEABLE IRON FITTINGS ASME B16.3 (UP TO AND INCLUDING 2") AND FORGED STEEL ASTM A234 (ABOVE 2") WITH THREADED JOINTS (UP TO AND INCLUDING 2") AND WELDED JOINTS (ABOVE 2") ANSI B31.1, B31.2 & B31.9 OR MECHANICAL JOINTS. FLANGES, UNIONS AND COUPLING 2" AND UNDER SHALL BE FERROUS PIPE, MALLEABLE IRON WITH THREADED UNIONS, RATED FOR 150 PSI, ON PIPING OVER 2" USE FORGED STEEL SLIP ON FLANGES, 1/16" THICK PRE-FORMED NEOPRENE GASKETS, EQUIPMENT DRAINS AND OVERFLOWS SHALL BE STEEL PIPE ASTM A53, SCHEDULE 40, GALVANIZED WITH GALVANIZED CAST IRON FITTINGS OR MALLEABLE IRON FITTINGS ASTM B16.3, AND THREADED OR GROOVED MECHANICAL JOINTS. THE COLD WATER PIPING ABOVE GRADE SHALL BE COPPER TUBING, ASTM B88 TYPE, HARD DRAWN, WITH ASME B16.18, CAST BRASS OR ASME B16.22 SOLDER WROUGHT COPPER FITTINGS, AND 95/5 SOLDER (ASTM B32) LEAD FREE JOINTS. GATE VALVES UP TO AND INCLUDING 2" SHALL BE BRONZE BODY, BRONZE TRIM, UNION BONNET, NON-RISING STEM, INSIDE SCREW, SOLID WEDGE DISC, SOLDER OR THREADED ENDS. ABOVE 2" USE GATE VALVES WITH IRON BODY, BRONZE TRIM, BOLTED BONNET, NON-RISING STEM, HANDWHEEL, OUTSIDE SCREW AND OKE, SOLID WEDGE DISK WITH BRONZE SEAT RINGS, AND FLANGED OR GROOVED ENDS. BALL VALVES UP TO AND INCLUDING 2" SHALL BE BRONZE TWO PIECE BODY, STAINLESS STEEL BALL, TEFLON SEATS AND STUFFING BOX RING, LEVER HANDLE, FLANGED, USE DIELECTRIC FITTINGS WHEN DISSIMILAR MATERIALS ARE JOINED TOGETHER. ALL SUPPORTS AND ANCHORS SHALL BE CONFORMING WITH ASME B31.9, AND MSS SP58, 69 & 89.
- FOR PIPING AND EQUIPMENT INSULATION REFER TO SECTIONS 15260 & 15280. THE INSULATION THICKNESS MUST EQUAL OR EXCEED THE REQUIREMENTS PRESCRIBED IN THE 2012 INTERNATIONAL ENERGY CONSERVATION CODE (IECC).
- FURNISH AND INSTALL INSTRUMENTATION AS INDICATED ON DRAWINGS AND REQUIRED. PRESSURE GAUGES SHALL BE AT LEAST 4-1/2" IN DIAMETER DRAWN STEEL CASE, PHOSPHOR BRONZE BOURDON TUBE, ROTARY BRASS MOVEMENT BRASS SOCKET WITH FRONT RECALIBRATION ADJUSTMENT, BLACK SCALE ON WHITE BACKGROUND, ON PERCENT MID-SCALE ACCURACY, ASME B40.1 & UL 393. STEM TYPE THERMOMETERS SHALL BE AT LEAST 7" LONG SCALE, RED APPEARING MERCURY, LENS FRONT TUBE, CAST ALUMINUM GAS WITH ENAMEL FINISH AND POLYCARBONATE WINDOW, WITH 2 PERCENT ACCURACY, ASTM E1 AND ASTM B77, REFER TO SECTION 15952 FOR ADDITIONAL INFO.
- FURNISH AND INSTALL ELECTRIC/ELECTRONIC CONTROLS, SUCH AS CONTROL PANELS, SENSORS, WIRING CONDUITS, ETC. AND PROVIDE ALL NECESSARY WORK INCLUDING DEMONSTRATION AND TRAINING TO THE OWNER'S PERSONNEL FOR COMPLETE OPERATIONAL SYSTEMS. PROVIDE ELECTRIC/ELECTRONIC PRODUCTS IN REQUIRED SIZES AND CAPACITIES, CONSISTING OF THERMOSTATS/TEMPERATURE SENSORS, ETC., APPLICABLE FOR THIS PROJECT. PROVIDE FACTORY-FABRICATED CONTROL PANELS, ETC. AND CONNECT TO THE EXISTING EXPANDED ENERGY MANAGEMENT SYSTEM (EMS), "JOHNSON CONTROLS" METASYS SYSTEM. ALL CONTROL WIRING SHALL BE COPPER, TWISTED PAIR SHIELDED TYPE, #16 AWG OR BETTER. MOUNT ALL CONTROL WIRING IN EMT CONDUITS IN DRY INTERIOR SPACES, AND MOUNT SAME IN GALVANIZED STEEL CONDUITS WITH LIQUDTIGHT FITTINGS IN INTERIOR WET SPACES (SUCH AS BOILER ROOM) OR IF EXPOSED OUTSIDE.
- FURNISH & INSTALL EQUIPMENT NAMEPLATES, PIPE MARKERS, DUCTWORK STENCILS, VALVE TAGS, ETC., MARKERS, IN COMPLIANCE WITH ANSI A13.1.
- PROVIDE THREE (3) SETS OF "AS-BUILT" DRAWINGS IN HARD COPIES AND DIGITAL FORMAT TO THE PROJECT ENGINEER FOR FINAL REVIEW AND APPROVAL AT PROJECT COMPLETION.
- THIS PROJECT SHALL BE DEEMED COMPLETE ONLY AFTER IS THOROUGHLY INSPECTED, DEMONSTRATED TO AND APPROVED IN WRITING BY THE LOCAL AUTHORITIES HAVING JURISDICTION, OWNER'S REPRESENTATIVE AND ARCHITECT/ENGINEER. ALL WARRANTIES SHALL START AFTER RECEIVING THESE APPROVALS.



GENERAL NOTES

- THE INFORMATION SHOWN ON THIS DRAWING IS BASED UPON THE INFORMATION SHOWN ON THE BUILDING PLANS, AND LIMITED FIELD INVESTIGATIONS AND MAY OR MAY NOT REFLECT ACTUAL FIELD CONDITIONS. THIS CONTRACTOR SHALL VERIFY THE INFORMATION INDICATED ON THIS DRAWING AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO SUBMITTING HIS BID.
- THIS CONTRACTOR IS REQUIRED TO PERFORM THIS WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, ORDINANCES, ETC. AND TO MEET THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND OWNER, WHETHER OR NOT SPECIFICALLY INDICATED OR SPECIFIED ON THIS DRAWING.
- ALL PENETRATIONS THRU FLOOR AND WALLS SHALL BE FIRE STOPPED WITH "THOMAS AND BETTS" - FLAMESAFE, TYPE FST FIRESTOP COMPOUND OR APPROVED EQUIVALENT, CONFORMING TO ASME E814/UL1479.

REVISIONS		COPYRIGHT NOTICE		CONTRACTOR:	
NO.	NATURE OF REVISION	DATE	BY	Project Engineer:	Project:
1				DUMITRU T. PETRESCU, P.E., LLC	TOWN OF FAIRFIELD
2				Mechanical & Electrical Consulting Engineers	FAIRFIELD PUBLIC SCHOOLS
3					BOILER REPLACEMENT AT
4					HOLLAND HILLS
5					105 MEADOWCRAFT ROAD, FAIRFIELD, CT
6					BID #2018-68
					SHEET DESCRIPTION
					BOILER ROOM - MECHANICAL FLOOR PLAN
				drawn by CP	
				scale NOTED	
				date March, 2018	
				checked by DTP	
				project number	
					DTP18012
					drawing number



BOILER ROOM - ELECTRICAL DEMOLITION PLAN
SCALE: 3/8"=1'-0"

SCOPE OF WORK - ELECTRICAL DEMOLITION

1. - DISCONNECT, REMOVE AND DISPOSE IN A LEGAL MANNER OF ALL EQUIPMENT, MATERIALS, ETC., AS INDICATED, SHOWN OR IMPLIED. NOTE, THAT THERE IS EQUIPMENT INDICATED TO BE REUSED OR TURNED OVER TO THE OWNER'S REPRESENTATIVE.
2. - THIS WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE 2016 CONNECTICUT STATE BUILDING CODE & FIRE SAFETY CODES, 2014 NATIONAL ELECTRICAL CODE, 2012 INTERNATIONAL ENERGY CONSERVATION CODE AND FIRE SAFETY CODES, 2011 NATIONAL ELECTRICAL CODE, 2012 INTERNATIONAL ENERGY CONSERVATION CODE (IECC), ANY OTHER APPLICABLE CODES, STANDARDS, REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES AND UTILITIES COMPANIES HAVING JURISDICTION.
3. - THIS CONTRACTOR SHALL PROVIDE A DETAILED SCHEDULE OF DEMOLITION WORK, REQUIRED FOR EACH INDIVIDUAL PIECE OF EQUIPMENT, COORDINATED WITH THE ANTICIPATED DELIVERIES OF THE NEW EQUIPMENT. THIS PROPOSED SCHEDULE OF DEMOLITION WORK SHALL BE APPROVED IN WRITING BY THE OWNER'S REPRESENTATIVE AND APPROVED IN WRITING BY THE PROJECT ENGINEER, PRIOR TO STARTING ANY CONSTRUCTION WORK.
4. - IF THIS CONTRACTOR ENCOUNTERS IN HIS DEMOLITION WORK ANY SUSPECTED ASBESTOS MATERIALS, HIS/HER SHALL STOP WORK AND PROMPTLY REPORT THIS CONDITION TO THE PROJECT ENGINEER AND OWNER'S REPRESENTATIVE(S).
5. - THIS WORK SHALL BE PERFORMED DURING THE SUMMER RECESS OF 2018, AND REQUIRES TO BE COMPLETED NOT LATER THAN OCTOBER 1, 2018.
6. - DISCONNECT POWER AND CONTROLS WIRING/CONDUITS FROM EXISTING EQUIPMENT AND DEVICES SERVING BOILER B1 TO BE REMOVED OR REMOVED/REPLACED UNDER THIS PROJECT.
7. - REFER TO THE DEMOLITION NOTES ON THIS DRAWING.
8. - DISCONNECT EXISTING UNUSED CONTROL PANELS, REMOVE THESE PANELS AND RELATED WIRING/CONDUITS IN THEIR ENTIRETY, AS INDICATED AND REQUIRED. CLOSELY COORDINATE THIS WORK WITH THE MECHANICAL CONTRACTOR.
9. - TEMPORARILY IDENTIFY ALL EXISTING WIRING/CONDUITS CONNECTIONS WITH PLASTIC MARKERS, AS TO CLEARLY EASE THE CONSTRUCTION WORK, REQUIRED TO BE PERFORMED LATER.
10. - THIS CONTRACTOR SHALL BE A CERTIFIED ELECTRICAL CONTRACTOR IN THE STATE OF CONNECTICUT, SPECIALIZED IN THIS TYPE OF WORK. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CONSTRUCTION PERMITS, PAY ALL REQUIRED FEES, APPLICABLE TAXES, ETC., IF ANY, AND PERFORM ALL TESTS REQUESTED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.
11. - THIS DEMOLITION WORK SHALL BE DEEMED COMPLETE ONLY AFTER IS INSPECTED, AND APPROVED IN WRITING BY PROJECT ENGINEER AND OWNER'S REPRESENTATIVE.

DEMOLITION NOTES:

1. EXISTING CAST IRON, LOW PRESSURE STEAM, DUAL FUEL BOILER B1, "H.B. SMITH", MODEL G0528A-S-10, RATED FOR 75 BHP, TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
2. EXISTING BOILER B1 DUAL FUEL BURNER, "POWER FLAME", MODEL C2-G0-20B1, 1-1/2 HP MOTOR @ 208V/3 PH, TO BE DISCONNECTED, REMOVED AND TURNED OVER TO OWNER'S REPRESENTATIVE OR DISPOSED OF IN A LEGAL MANNER.
3. EXISTING FUEL OIL PUMP TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
4. EXISTING CAST IRON, LOW PRESSURE STEAM, DUAL FUEL BOILER B2, "WEIL McLAIN", SERIES 88, MODEL 1088, RATED FOR 73.2 BHP, TO REMAIN.
5. EXISTING BOILER B2 DUAL FUEL BURNER, "RIELLO", MODEL RLS70.
6. EXISTING 330 GALLONS FUEL OIL #2 HORIZONTAL STORAGE TANK IN CONTAINMENT DIKE ENCLOSURE, LOCATED BELOW LANDING PLATFORM, TO REMAIN.
7. EXISTING FUEL OIL PUMPS FOP1 & 2, TO REMAIN.
8. EXISTING UTILITY TRENCH WITH COVER, TO REMAIN.
9. EXISTING STEAM CONDENSATE BOILERS FEED SYSTEM, TO REMAIN.
10. EXISTING GAS-FIRED DOMESTIC WATER HEATER, "A. O. SMITH", MODEL FSG-75, RATED FOR 75.1 MBH/CFH, 71 GALLONS CAPACITY & 125 GPH FIRST HOUR RECOVERY RATE, TO REMAIN.
11. EXISTING ELECTRIC DOMESTIC WATER HEATER STORAGE TANK, "RHEEM", MODEL PRO+E50 T2 RH95 EC1, 63 GALLONS CAPACITY, 21 GPH FIRST HOUR RECOVERY RATE, TO REMAIN.
12. EXISTING COMBUSTION AIR SUPPLY FAN, "TJERNLUND", MODEL PAI-7, RATED FOR 3,200 MBH/CFH TO REMAIN (TYP. OF 2).
13. EXISTING CONTROLS AIR COMPRESSOR CAC1 TO REMAIN.
14. EXISTING "JOHNSON CONTROLS" CONTROL PANEL TO REMAIN.
15. EXISTING "JOHNSON CONTROLS" METASYS CONTROL PANEL LOCATED ON WALL UNDER LANDING, TO REMAIN (TYP).
16. EXISTING "ROBERT SHAW" ENERGY CONTROL PANEL TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
17. EXISTING REFRIGERATED AIR DRYER TO REMAIN.
19. EXISTING EMERGENCY SHUTDOWN SWITCH TO REMAIN (TYP).
20. EXISTING 600 AMPS @ 208V/3 PH MAIN DISTRIBUTION PANEL (MDP) TO REMAIN.
21. EXISTING FIRE ALARM CONTROL PANEL (FACP) TO REMAIN.
22. EXISTING SUSPENDED FLUORESCENT LIGHTING FIXTURE TO REMAIN (TYP).
23. EXISTING CARBON MONOXIDE DETECTION/CONTROLLER TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
24. EXISTING THERMAL SWITCH TO REMAIN.
25. EXISTING THERMAL SWITCH TO BE DISCONNECTED, REMOVED AND DISPOSED OF IN A LEGAL MANNER.
26. EXISTING ELECTRICAL PANELBOARD TO REMAIN.
27. EXISTING DISCONNECT SWITCH TO REMAIN.
28. EXISTING EQUIPMENT STARTER TO REMAIN (TYP).
29. EXISTING OLD TELEPHONE APPARATUS TO BE REMOVED.
30. EXISTING TELEPHONE APPARATUS TO BE REMAIN.
31. TUNNEL FIRE RATED ACCESS DOOR.
32. CHECK EXISTING ELECTRICAL EQUIPMENT AND DEVICES LOCATED ON THIS WALL. ALL INACTIVE ITEMS, SHALL BE DISCONNECTED, REMOVED BACK TO SOURCE AND DISPOSED OF IN A LEGAL MANNER.
33. EXISTING PROPELLER EXHAUST FAN HIGH ON WALL TO REMAIN.

LEGEND AND ABBREVIATIONS

---	EXISTING EQUIPMENT/DUCTWORK/PIPING TO REMAIN (E)
---	EXISTING EQUIPMENT/DUCTWORK/PIPING TO BE REMOVED (R)
---	NEW DUCTWORK/PIPING/EQUIPMENT
B#	BOILER
BCP#	BOILERS CONTROL PANEL
CAC#	CONTROLS AIR COMPRESSOR
G	GAS PIPING
FOS/R	FUEL OIL SUPPLY/RETURN PIPING
LPS/R	LOW PRESSURE STEAM RETURN PIPING
PC	PUMP CONDENSATE
FD	FLOOR DRAIN
D	DRAIN PIPING
C	COLD WATER PIPING
LWCO	LOW WATER CUTOFF
FACP	FIRE ALARM CONTROL PANEL
FG#	FUEL GAS AND TEMPERATURE MONITOR AND CUTOFF
MM#	MCDONNELL MILLER LWCO
S	SWITCH, LIGHTING
SS	SERVICE SWITCH
SEM	EMERGENCY SHUTDOWN SWITCH
⊖	THERMOSTAT/TEMPERATURE SENSOR
⊕	CARBON MONOXIDE DETECTION/CONTROLLER
⊖	THERMAL SWITCH
FE	FIRE EXTINGUISHER
⊕	EXIT SIGN
⊕	EMERGENCY LIGHT, SELF-CONTAINED
⊕	DISCONNECT SWITCH
⊕	EQUIPMENT STARTER
⊕	FIRE ALARM PULL STATION
⊕	FIRE ALARM COMBINATION HORN/STROBE
⊕	BALL VALVE
⊕	FUSOMATIC VALVE
⊕	PRESSURE GAUGE
⊕	THERMOMETER
⊕	OIL STRAINER
⊕	SAFETY VALVE
⊕	PRESSURE SENSOR
⊕	TEMPERATURE SENSOR
⊕	EXISTING TO REMAIN
⊕	EXISTING TO BE RELOCATED
⊕	EXISTING TO BE REMOVED

REVISIONS	
NO.	DATE
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Project Engineer:
DUMITRU T. PETRESCU, P.E., LLC
Mechanical & Electrical Consulting Engineers
567 Raycoe Terrace, Hamden, CT 06514-1008
(203) 287-9995

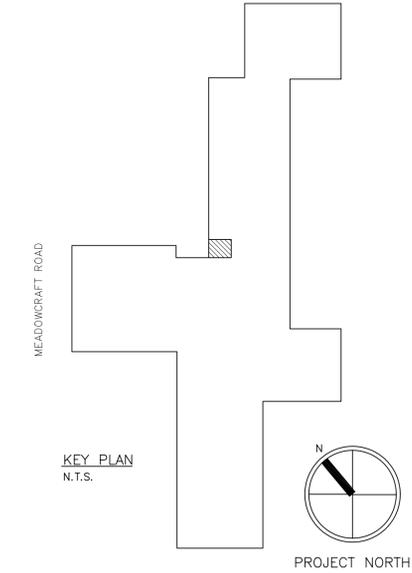
CONTRACTOR:

Project:
TOWN OF FAIRFIELD
FAIRFIELD PUBLIC SCHOOLS
PROJECT - ADDRESS
BOILER REPLACEMENT AT
HOLLAND HILL E.S.
105 MEADOWCRAFT ROAD, FAIRFIELD, CT
BID #2018-68
SHEET DESCRIPTION
BOILER ROOM - ELECTRICAL DEMOLITION PLAN

drawn by CP
scale NOTED
date MARCH, 2018
checked by DTP
project number

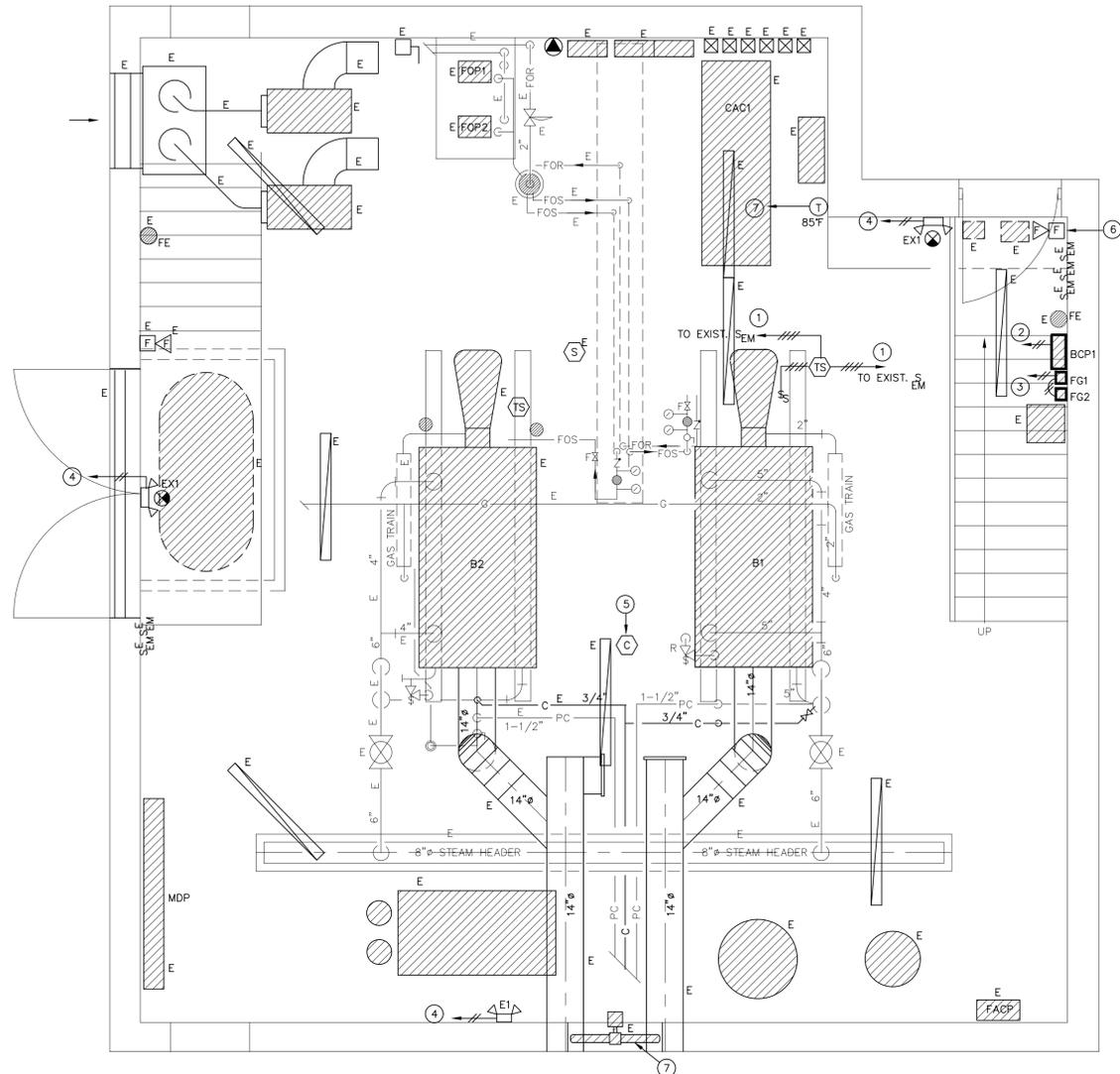
DTP18012

drawing number
DE-1



GENERAL NOTES

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2. - THIS CONTRACTOR IS REQUIRED TO PERFORM THIS WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, ORDINANCES, ETC., AND TO MEET THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND OWNER, WHETHER OR NOT SPECIFICALLY INDICATED OR SPECIFIED ON THIS DRAWING.
3. - ALL PENETRATIONS THRU FLOOR AND WALLS SHALL BE FIRE STOPPED WITH "THOMAS AND BETTS" - FLAMESAFE, TYPE FST FIRESTOP COMPOUND OR APPROVED EQUIVALENT, CONFORMING TO ASME E814/JUL1479.



BOILER ROOM - ELECTRICAL FLOOR PLAN
SCALE: 3/8"=1'-0"

- CONSTRUCTION NOTES:**
- REWIRE THE NEW BOILER/BURNER B1 WITH 4#10+1#12G, 3/4"C TO EXISTING BURNER CIRCUIT IN SERIES WITH A NEW THERMAL SWITCH AND EXISTING EMERGENCY SHUTDOWN SWITCHES.
 - WIRE THE NEW BOILERS CONTROL PANEL BCP1 WITH 2#12+1#12G, 3/4"C TO EXIST POWER CIRCUIT. (FROM REMOVED PANEL)
 - WIRE THE NEW FLUE GAS TEMPERATURE MONITORS AND CUTOUTS WITH 2#12+1#12G, 3/4"C TO EXISTING POWER CIRCUIT (FROM REMOVED CONTROL PANEL)
 - WIRE THE NEW EMERGENCY FIXTURE "E1" AND "EX1" WITH 2#12+1#12G, 3/4"C, TO EXISTING LIGHTING CIRCUIT.
 - NEW APPROVED TYPE CARBON MONOXIDE DETECTOR/CONTROLLER, W/BATTERY BACK-UP AND AUDIO VISUAL ALARM TO BE WIRED TO FACP, UL LISTED.
 - NEW FIRE ALARM PULL STATION AND COMBINATION HORN/STROBE, COMPATIBLE WITH THE FACP, UL LISTED. WIRE TO THE FACP AND TEST AS PER NFPA-52 REQUIREMENTS.
 - CHECK OPERATION OF THE EXISTING FAN, AND RENDER IT OPERATIONAL. PROVIDE NEW WALL MOUNTED HIGH LIMIT THERMOSTAT, SET AT 85F, LOCATED WHERE SHOWN ON THIS DRAWING.

- EQUIPMENT SELECTION**
- E1 NEW SELF-CONTAINED HIGH CAPACITY EMERGENCY LIGHT, EQUAL TO "COOPER LIGHTING" SURE-LITE MODEL UMB17-TM-VS2WP, RATED FOR 48 WATTS FOR 1-1/2 HOURS, FURNISHED WITH TIME DELAY MONITOR AND POLYCARBONATE WEATHER SHIELD, 120V/1 PH. UL LISTED FOR WET LOCATIONS. WIRE WITH 2#12+1#12G,
- EX1 COMBINATION EMERGENCY LIGHT & EXIT SIGN, EQUAL TO "COOPER LIGHTING" MODEL COX7080R0W0WSDW2, RATED FOR 13.2W @ 120V/1 PH WITH LED CALCIUM BATTERY AND LED EXIT LIGHTS, FURNISHED WITH FIRE ALARM INTERFACE, WITH WHITE HOUSING WITH RED LETTERS, SELF-DIAGNOSTICS AND WIRE GUARD, UL LISTED FOR WET LOCATIONS.

EQUIPMENT SELECTION: (PROVIDED FOR ELECTRICAL COORDINATION)

BOILERS

B1 BOILER, LOW PRESSURE CAST IRON TYPE, EQUAL TO "WEIL MCLAIN", 88 SERIES 2 COMMERCIAL BOILER MODEL BQ-1088S, RATED FOR 76.5 BHP I=B=R, 3,082 MBH/GPH I=B=R MAXIMUM GAS INPUT FIRING RATE @ 7.5" W.C. MINIMUM GAS PRESSURE WITH 83.6% COMBUSTION EFFICIENCY & 83.1% THERMAL EFFICIENCY, 21.5 GPH I=B=R MAXIMUM FUEL OIL #2 FIRING RATE WITH 86.2% COMBUSTION EFFICIENCY & 85.6% THERMAL EFFICIENCY, 2,561 MBH I=B=R GROSS OUTPUT, 1,988 MBH I=B=R NET HEATING OUTPUT & 8,283 SOFT NET I=B=R RATING, 14"Ø FLUE OUTLET, 247 GALLONS WATER CONTENT, 82-3/4"L x 44-3/4"W x 65"H, 6,130 LBS APPROX. SHIPPING WEIGHT, FURNISHED WITH DUAL FUEL BURNER, EQUAL TO "RIELLO", MODEL RLS100, RATED FOR 3,103 MBH/CPH GAS INPUT, 21.5 GPH FUEL OIL #2 FIRING RATE, LOW/HIGH/LOW FIRING SEQUENCE, 3 HP MOTOR @ 208V/ 3 PH, 45.75"L x 28.88"W x 12.75"H, 165 LBS OPERATING WEIGHT, ASME, AHRI, AND SA CERTIFIED. THE BOILER TAPPING ARE, AS FOLLOW: (2) 5" LOW PRESSURE STEAM SUPPLY, (2) LOW PRESSURE STEAM RETURN, 14"Ø FLUE GAS VENT, (2) 2" SAFETY VALVE/SKIM TAPPINGS, 1" SECONDARY PROBE INCO, (2) 1" LOW WATER CUTOFFS, (2) 1" ALTERNATE LOW WATER CUTOFFS, (2) 1/2" GAUGE GLASS, (2) 3/8" TRY COCK, 3/4" PRESSURE LIMIT CONTROL, PRESSURE OPERATING CONTROL AND PRESSURE GAUGE, 3/4" BOILER DRAIN AND 2" BLOWDOWN/DRAIN WITH 1-1/4" MINIMUM BLOWOFF VALVE SIZE.

NOTES:

- THE BOILER'S SECTIONS SHALL BE FIELD ERRECTED, HYDRAULICALLY TESTED AT 50 PSI FOR 24 HOURS, IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY. REMOVE AND REPLACE ANY FAILED SECTION(S), AS REQUIRED.
- CONNECT LOW PRESSURE STEAM & RETURN, PUMP CONDENSATE, DRAIN & BLOW DOWN, GAS & FUEL OIL PIPING, INSTALL THE STEAM BOILER CONTROLS, AND CONNECT THE BOILER'S VENT, AS INDICATED, IMPLIED AND REQUIRED FOR COMPLETE OPERATIONAL SYSTEMS. TEST THE NEW STEAM BOILER OPERATION BOTH USING NATURAL GAS & FUEL OIL #2, AND PROVIDE ALL NECESSARY ADJUSTMENTS, IN THE PRESENCE OF THE FACTORY REPRESENTATIVE AND OWNER'S PERSONNEL. THE FACTORY REPRESENTATIVE SHALL PROVIDE A WRITTEN REPORT AND CERTIFY THIS INSTALLATION, AS REQUIRED. THE BOILER/BURNER ASSEMBLY WARRANTY SHALL START UPON THIS WRITTEN CERTIFICATION AND ITS APPROVAL BY THE PROJECT ENGINEER.
- PROVIDE DEMONSTRATION AND INSTRUCT THE OWNER'S PERSONNEL IN OPERATING THIS NEW STEAM BOILER FOR AT LEAST (4) HOURS.
- SEISMICALLY ANCHOR THIS NEW BOILER TO EXISTING STEEL BEAMS IN AN ACCEPTABLE MANNER AS TO ALLOW THE BOILERS SECTION EXPANSION & CONTRACTION, APPROVED BY A LICENSED STRUCTURAL ENGINEER.
- THE EXISTING & NEW STEAM BOILERS SHALL OPERATE FROM THE LOCAL BOILERS CONTROL PANEL (BCP1) AND SHALL BE FULLY MONITORED BY THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM. REFER TO SPECIFICATIONS.
- THIS BOILER SERVICE SWITCH SHALL BE WIRED IN SERIES WITH A THERMAL SWITCH AND AN EMERGENCY SHUTDOWN SWITCH BY THE ELECTRICAL CONTRACTOR.

BOILERS CONTROL PANEL

BCP1 BOILERS CONTROL PANEL SHALL BE EQUAL TO "HEAT TIMER", MODEL MPC PLATINUM, CAPABLE OF LEAD/LAG CONTROL, BUILT-IN OUTDOOR RESET, ADJUSTABLE SYSTEM RUN-ON DELAY, DAY/NIGHT MODES, SUMMER/WINTER SWITCH, FURNISHED WITH REMOTE COMMUNICATION AND BACnet INTERFACE WITH THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM, 30 WATTS @ 120V/1 PH, UL LISTED.

NOTES:

- INSTALL THE BOILERS CONTROL PANEL IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY.
- THE BOILER'S CONTROL PANEL SHALL LOCALLY CONTROL THE OPERATION OF THE STEAM BOILER ASSEMBLIES B1 & 2.
- THE BOILERS CONTROL PANEL SHALL BE FULLY MONITORED BY THE EXISTING ENERGY MANAGEMENT SYSTEM (EMS) - "JOHNSON CONTROLS" METASYS SYSTEM. PROVIDE ALL NECESSARY CONTROLLERS, SENSORS, RELAYS, WIRING/CONDUITS, SOFTWARE, PROGRAMMING, ETC., AS REQUIRED FOR A FULLY OPERATIONAL SYSTEM.

FLUE GAS TEMPERATURE MONITORS & CUTOUTS

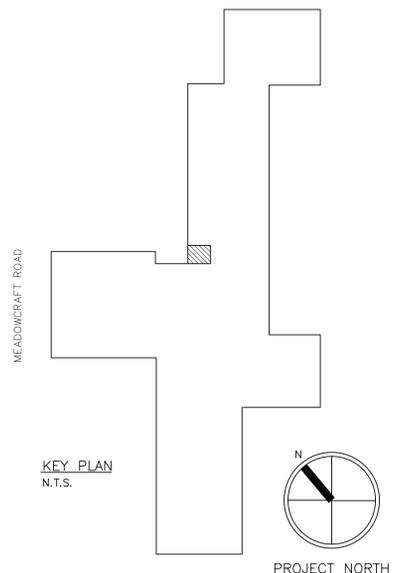
FG1 & 2 FLUE GAS TEMPERATURE MONITOR & CUTOUT SHALL BE EQUAL "PREFERRED UTILITIES MANUFACTURING CORPORATION", MODEL JC-150, FURNISHED WITH NUMERIC LED DISPLAY WITH MENUS FOR LOW BOILERS EFFICIENCY ALARM MESSAGE AND CONTACT, BURNERS SHUTDOWN CONTACTS AND MESSAGE, AND PROVIDE ALL NECESSARY TYPE J THERMOCOUPLES, WIRING/CONDUITS, LOCAL AUDIO VISUAL ALARM, FLEXIBLE COMMUNICATIONS AND DATA LOGGING, 15 WATTS @ 120V/1 PH, UL LISTED, AND INTERFACE WITH THE EXISTING "JOHNSON CONTROLS" METASYS ENERGY MANAGEMENT SYSTEM (EMS).

NOTES:

- INSTALL THE FLUE GAS TEMPERATURE MONITORS & CUTOUTS IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, RECOMMENDATIONS AND WARRANTY.
- PROVIDE ALL NECESSARY CONTROLLERS, SENSORS, RELAYS, WIRING/CONDUITS, SOFTWARE, PROGRAMMING, ETC., AS REQUIRED FOR A FULLY OPERATIONAL SYSTEM, AS NECESSARY TO INTERFACE WITH THE EXISTING EMS.

- SCOPE OF WORK - NEW WORK**
- FURNISH AND INSTALL NEW EQUIPMENT, DEVICES, MATERIALS, ETC., AND PROVIDE ALL REQUIRED LABOR, TESTING, ETC., FOR PROVIDING POWER TO MECHANICAL EQUIPMENT FURNISHED BY OTHERS, FOR COMPLETE OPERATIONAL SYSTEMS, APPROVED BY THE LOCAL AUTHORITIES HAVING JURISDICTION, OWNER'S REPRESENTATIVE(S), AND PROJECT ENGINEER.
 - THIS WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE 2016 CONNECTICUT STATE BUILDING AND FIRE SAFETY CODES, 2012 INTERNATIONAL BUILDING CODE, 2014 NATIONAL ELECTRICAL CODE (NEC), 2009 INTERNATIONAL ENERGY CONSERVATION CODE, NFPA-72, ANY OTHER APPLICABLE CODES, STANDARDS, REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES AND UTILITIES COMPANIES HAVING JURISDICTION.
 - THIS CONTRACTOR SHALL SUBMIT TO THE PROJECT ENGINEER FOR COMMENT AND APPROVAL SHOP DRAWINGS FOR ALL EQUIPMENT, DEVICES, MATERIALS, ETC., AND FURTHER OBTAIN ALL NECESSARY APPROVALS, PRIOR TO ANY WORK.
 - FURNISH AND INSTALL NEW DISCONNECT SWITCHES, COMBINATION MOTOR STARTERS/DISCONNECT SWITCHES, OUTLETS TO SUIT EQUIPMENT, JUNCTION BOXES, WIRING/CONDUITS, EMERGENCY LIGHTING FIXTURES, FIRE ALARM DEVICES, ETC., AS REQUIRED FOR COMPLETE OPERATION OF ALL SYSTEMS.
 - ALL WIRING SHALL BE COPPER, RATED FOR 600 VOLTS WITH THWN OF THIN INSULATION. ALL WIRING INSIDE THE BOILER ROOM SHALL BE MOUNTED IN GALVANIZED STEEL RIGID CONDUITS FURNISHED WITH LIQUIDTIGHT CONDUITS, UNLESS OTHERWISE NOTED. ALL CONTROL WIRING SHALL BE COPPER, TWISTED SHIELDED PAIR #16 AWG OR BETTER, AND BE MOUNTED IN EMT CONDUITS IN ALL INDOOR DRY AREAS AND IN GALVANIZED STEEL CONDUITS WITH LIQUIDTIGHT FITTINGS IN WET AREAS AND BOILER ROOM.
 - PROVIDE POWER FOR NEW CONTROLS, SUCH AS THE NEW INDICATED CONTROL PANELS, ETC., AS REQUIRED.
 - FURNISH AND INSTALL NEW FIRE ALARM DEVICES COMPATIBLE WITH THE BUILDING'S FIRE ALARM SYSTEM. WIRE THE NEW FIRE ALARM DEVICES WITH APPROVED UL LISTED WIRING/CONDUITS TO EXISTING FIRE ALARM CONTROL PANEL (FACP), AND TEST IN STRICT ACCORDANCE WITH THE NFPA-72 REQUIREMENTS.
 - PROVIDE GROUNDING AND BONDING FOR ALL NEW EQUIPMENT AND DEVICES, IN STRICT ACCORDANCE WITH THE 2011 NEC. PROVIDE GROUNDING CONDUCTORS IN CONDUITS FOR NEW BOILERS, PUMPS, CONTROL PANELS, ETC. AND PROVIDE BONDING TO EXISTING BUILDING GROUND IN BOILER ROOM.
 - THIS CONTRACTOR SHALL BE A CERTIFIED ELECTRICAL CONTRACTOR IN THE STATE OF CONNECTICUT, SPECIALIZED IN THIS OF WORK. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CONSTRUCTION PERMITS, PAY ALL REQUIRED FEES, APPLICABLE TAXES, ETC., IF ANY, AND PERFORM ALL TESTS REQUESTED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.
 - FURNISH & INSTALL IDENTIFICATION DEVICES, SUCH AS EQUIPMENT AND DEVICES NAMEPLATES, WIRE AND CONDUIT MARKERS, ETC., AND UPDATE EXISTING PANELBOARD DIRECTORIES.
 - THIS WORK SHALL BE DEEMED COMPLETE ONLY AFTER IS TESTED, DEMONSTRATED TO AND APPROVED IN WRITING BY THE AUTHORITY HAVING JURISDICTION, PROJECT ENGINEER AND OWNER'S REPRESENTATIVE. ALL WARRANTIES AND ONE (1) YEAR SERVICE CONTRACT SHALL START ONLY UPON RECEIVING THESE APPROVALS.
 - THREE (3) SETS OF "AS-BUILT" DRAWINGS IN HARD COPIES AND DIGITAL FORMAT SHALL BE PROVIDED TO THE PROJECT ENGINEER FOR FINAL REVIEW, PRIOR TO FINAL COMPLETION.

- GENERAL NOTES**
- THE INFORMATION SHOWN ON THIS DRAWING IS BASED UPON THE INFORMATION SHOWN ON THE BUILDING PLANS AND LIMITED FIELD INVESTIGATIONS AND MAY OR MAY NOT REFLECT ACTUAL FIELD CONDITIONS. THIS CONTRACTOR SHALL VERIFY THE INFORMATION INDICATED ON THIS DRAWING AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO SUBMITTING HIS BID.
 - THIS CONTRACTOR IS REQUIRED TO PERFORM THIS WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, ORDINANCES, ETC., AND TO MEET THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION AND OWNER, WHETHER OR NOT SPECIFICALLY INDICATED OR SPECIFIED ON THIS DRAWING.
 - ALL PENETRATIONS THRU FLOOR AND WALLS SHALL BE FIRE STOPPED WITH "THOMAS AND BETTS" - FLAMESAFE, TYPE FST FIRESTOP COMPOUND OR APPROVED EQUIVALENT, CONFORMING TO ASME E814/UL1479.



REVISIONS		COPYRIGHT NOTICE		CONTRACTOR:	
NO.	DATE	NATURE OF REVISION	Project Engineer:	TOWN OF FAIRFIELD	PROJECT - ADDRESS
1			DUMITRU T. PETRESCU, P.E., LLC	FAIRFIELD PUBLIC SCHOOLS	BOILER REPLACEMENT AT
2			Mechanical & Electrical Consulting Engineers		HOLLAND HILL E.S.
3					105 MEADOWCRAFT ROAD, FAIRFIELD, CT
4					BID #2018-68
5					SHEET DESCRIPTION
6					BOILER ROOM - ELECTRICAL PLAN

567 Raycoe Terrace, Hamden, CT 06514-1008
(203) 287-9995

Project number: DTP18012

drawing number: E-1