

Haines Borough

Public Safety Building Boiler Replacement Project

Project Manual

BID & BID INSTRUCTIONS, CONTRACT DOCUMENTS AND SPECIFICATIONS



Contact:

Office of the Borough Clerk
Haines Borough
103 Third Ave. S
P.O. Box 1209, Haines, AK 99827
907-766-2231 x31 or 60
FAX - 907-766-2716
jcozzi@haines.ak.us
or
jheinz@haines.ak.us

Issued: March 8, 2012

Bid Deadline: 2:00pm, Thursday, March 29, 2012

Public Safety Building Boiler Replacement Project

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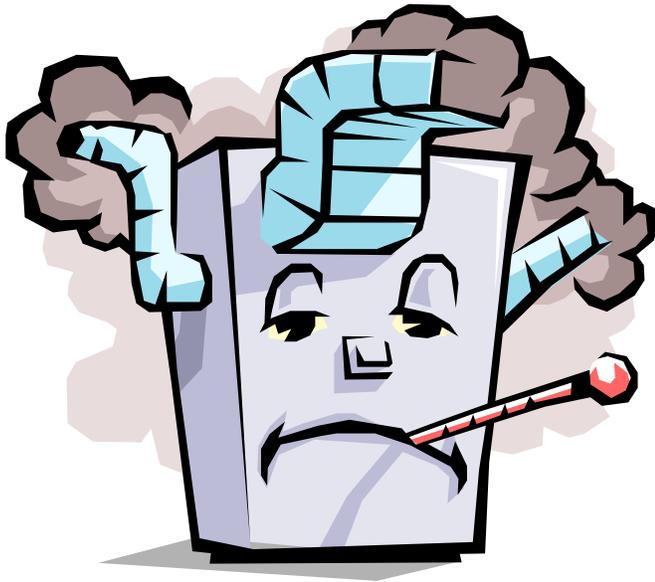
HAINES BOROUGH
HAINES, ALASKA

PUBLIC NOTICE

REQUEST FOR BIDS

Public Safety Building Boiler Replacement

The Haines Borough is soliciting bids from qualified and licensed contractors to replace the heating system and associated equipment in the Public Safety Building located at 213 Haines Highway in Haines, Alaska. Sealed bids will be accepted until 2:00pm Local Time, Thursday, March 29, 2012 at the Haines Borough Administrative Offices in Haines, AK. Bids will be opened and read at that time. In general, the scope of work includes removal of the existing heating plant, chimney breaching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boilers, circulating pumps, heating piping, oil delivery system, chimney breaching, and electronic controls. Alternate work includes replacement of underground storage fuel tank. After completion contractor will provide startup and testing of system. The expected project completion date is August 30, 2012. **This project is subject to the State's minimum wage laws (AS 36.05).**



An RFP packet including instructions, forms, specs, and drawings is available from the Borough Clerk's Office:

Attn: Julie Cozzi, Borough Clerk
103 Third Ave / P.O. Box 1209
Haines, Alaska 99827
Phone: 907-766-2231
Email: jcozzi@haines.ak.us
Online at www.hainesborough.us

Questions should be directed to:

Brian Lemcke, Public Facilities Director
Haines Borough, P.O. Box 1209
Haines, Alaska 99827
Phone: (907) 766-2257
Fax: (907) 766-2256
Email: bmaynard@haines.ak.us

Bids must include the following accompaniments:

HBC 3.60.100 Contract bid requirements.

All contract bids must contain:

- A. Copies of a current Alaska business license and a borough business license;*
- B. Copy of an Alaska contractor's certificate of registration, if appropriate;*
- C. Acknowledgement of all addenda;*
- D. A bid bond of at least five percent of the amount of the bid or a certified check drawn to the Haines Borough in like amount. Checks and bid bonds will be returned to unsuccessful bidders.*

Submittal Deadline: 2:00pm Local Time, Thursday, March 29, 2012

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT**

REQUEST FOR BIDS & BIDDER INSTRUCTIONS

Description of Work. The Haines Borough is soliciting bids from qualified and licensed contractors to replace the heating system and associated equipment in the Public Safety Building located at 213 Haines Highway in Haines, Alaska. In general, the scope of work includes removal of the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boilers, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls. Alternate work includes replacement of underground storage fuel tank. The attached documents include all information for execution of the project. **This project is subject to the State's prevailing wage laws** (AS 36.05). The expected project completion date is August 30, 2012.

Receipt of Bids. Sealed bids will be accepted by mail, in person or by courier until 2:00pm Local Time, Thursday, March 29, 2012 at the Office of the Borough Clerk:

Julie Cozzi, Borough Clerk
Haines Borough Administration
P.O. Box 1209 / 103 Third Avenue S.
Haines, Alaska 99827-1209

Any bid received after the time and date specified shall not be considered.

Opening of Bids. The bids will be publicly opened and read shortly after 2:00 p.m. Local Time, on Thursday, March 29, 2012, in the Haines Borough Offices, 103 Third Avenue South, Haines, AK.

Bid Packet. Bidders must provide one signed copy of the Bid on the provided Bid Form, in a sealed envelope clearly labeled "PUBLIC SAFETY BUILDING BOILER REPLACEMENT PROJECT." The sealed envelope must include a Bid Bond in the amount of 5% of the total bid price, payable to the Haines Borough, as a guarantee that the Bidder, if its bid is accepted, will execute the Agreement. The Bid Bond may be in the form of a certified check made payable to the Haines Borough or a Bid Bond issued by a surety licensed to do business in Alaska. Other required bid accompaniments are described on the Bid Form.

Bidders must acknowledge the receipt of any addenda in the space provided on the Bid Form. A bid that contains a substantial condition or qualification will not be accepted.

Each bidder is responsible for reading and being thoroughly familiar with the Request for Bid and the Bid documents. The failure or omission of any bidder to do any of the foregoing shall in no way relieve any bidder from any obligation in respect to its bid.

Project Schedule. The Haines Borough anticipates the following project schedule:

Request for Bids (Advertisement dates)	March 8, and March 15, 2012
Receive and open bids	March 29th, 2:00pm Local Time
Borough Assembly Authorization	April 10, 2012
Notice of Intent to Award	April 11, 2012
Notice to Proceed	April 25, 2012
Project Completion	August 30, 2012

Questions. All communication relative to the bidding, contract, technical work or site prior to opening bids shall be directed to:

Haines Borough, P.O. Box 1209, Haines, Alaska 99827
Attention: Brian Lemcke, Public Facilities Director
Telephone: (907) 766-2257 Email: blemcke@haines.ak.us

Modifications to Bids previously submitted. Bids previously sent by mail or other delivery method may be modified by facsimile up to 2:00pm Local Time, Thursday, March 29, 2012 provided that modifications do not state total bid but only the amount to modify the bid in the sealed envelope. Any Bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. No bidder may withdraw a bid within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period; the time may be extended by mutual agreement between the Borough and the successful bidder.

Owner's Rights Reserved. The owner reserves the right to waive any informalities or minor defects in a bid, to reject any and all bids and to make award to the responsive, responsible party who submits the lowest bid. Additionally, the owner may investigate as he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the owner all information and data for this purpose as the owner may request. The owner reserves the right to reject any bid if evidence fails to satisfy the owner that such bidder is properly qualified to carry out the obligations of the contemplated agreement for work.

Project Conditions. Bidders must satisfy themselves of the project conditions and the accuracy of any project specifications as stipulated in the Contract Documents prior to submitting a bid by examining the site and reviewing the Contract Documents, including Addenda. The failure or omission of any bidder to do any of the foregoing shall in no way relieve any bidder from any obligation in respect to his bid.

Selection Procedure. The Director of Public Facilities and a representative of the Haines Borough School District shall review all bids. Based on qualifications, compliance with request for bid requirements, and the bid amount, a contractor will be recommended for approval. The Borough will award the Haines School Vocational Education Building Improvements contract based upon the amount of the bid, as long as the bidder has the qualifications and experience to perform the contract as specified in HBC 3.60.160.

Contract Provisions. The contract documents contain the provisions required for this contract. Information obtained from an officer, agent or employee of the owner or any other person shall not affect the risk or obligations assumed by the contractor or relieve him from fulfilling any of the conditions of the contract.

Performance and Payment Bonds Required. A performance and a payment bond each in the amount of 100% of the contract price, with a corporate or other surety approved by the owner, will be required for the faithful performance of the contract. Attorneys-in-fact who sign bonds must file with each bond a certified and effected dated copy of the power of attorney.

Agreement Execution. The lowest responsive bidder is required to execute the agreement and obtain all required bonding and insurance within ten (10) days of Notice of Award issued by owner. If the bidder fails to execute the agreement, the owner may, at his option, consider the bidder in default, in which case the bid bond shall become the property of the owner.

The owner, within ten (10) days of receipt of the agreement signed by the lowest responsive bidder, shall sign the agreement and return an executed duplicate of the agreement. Should the owner not execute the agreement within such period, the bidder may, by written notice, withdraw his signed agreement, effective upon receipt by the owner.

Subcontracts. The lowest responsive bidder is required to submit, within ten (10) days of receipt of the fully executed agreement, one fully executed copy of each subcontract for work that exceeds one half of one percent of the intended contract award amount and one copy of subcontractor's certificates of insurance per Article IX of the agreement.

Notice to Proceed. The owner shall issue a Notice to Proceed within ten (10) days of the execution of the agreement or receipt of the subcontracts and associated documents, should there be any. If the Notice to Proceed cannot be issued within that period, the time may be extended by mutual

agreement. If the Notice to Proceed has not been issued within the ten (10) day period or within the period mutually agreed upon, the contractor may terminate the agreement without further liability on the part of either party.

Compliance With Laws. All applicable laws, ordinances and the rules and regulations of all authorities having jurisdiction over this agreement shall apply to the contract throughout.

The conduct of the bid and the conduct of the work will be governed by the Contract Documents.

Bid Requirements. A responsive bid must include the following at the time of bid opening:

1. Signed Bid and Bid Schedule with Alaska General Contractor's License Number
2. Bid Bond, certified or cashier's check
3. Non-collusion Affidavit

Additionally, a responsive bidder shall be expected to prove successful experience in similar projects.

Public Safety Building Boiler Replacement Project

BID FORM

REQUIRED SUBMITTALS:

Return **one signed copy of this Bid Form in a sealed envelope clearly labeled as "PUBLIC SAFETY BUILDING BOILER REPLACEMENT PROJECT."** The following documents must be attached to the bid form at the time of submission:

All contract bids must contain:

- A. Non-Collusion Affidavit
- B. Copies of a current Alaska business license and a borough business license;
- C. Copy of an Alaska contractor's certificate of registration, if appropriate;
- D. Acknowledgement of all addenda;
- E. A bid bond of at least five percent of the amount of the bid or a certified check drawn to the Haines Borough in like amount. Checks and bid bonds will be returned to unsuccessful bidders.

Bid of _____ (hereinafter called *Bidder*), doing business as (underline one) a corporation, partnership or individual, to the Haines Borough (hereinafter called *Borough*). The Bidder agrees to furnish to the Haines Borough all information and data that may be requested to give evidence that the undersigned is properly qualified to carry out the obligations of the Contract Documents.

The undersigned Bidder agrees, if this bid is accepted, to complete the work required under the Request for Bids by August 30, 2012 and to accept as full payment the Contract Price stated on this Bid Form, and in the manner stipulated by the Request for Bids, subject to any negotiated changes in the work that might increase or decrease the contract amount. The Borough reserves the right to reject any and all bids and negotiate with the responsible bidder submitting the lowest bid amount.

Bidder accepts all of the terms and conditions of the Request for Bids and, if this bid is accepted, will furnish the following documents required by borough code for this project:

HBC 3.60.130 Requirements for contract award.

A. The requirements for awarding a contract are:

- 1. Contract document or Agreement;
- 2. Payment Bond
- 3. Performance Bond
- 4. Non-collusion affidavit;
- 5. [Proof of insurance: general liability, auto insurance, worker's compensation];
- 6. Any overdue unpaid debts owed the borough must be current prior to award.

Bidder acknowledges receipt of the following addenda:

Addendum No. _____ Initials: _____ Addendum No. _____ Initials: _____

BIDDER INFORMATION:

Principal Contact: _____

Business Name: _____

Haines Borough Business License No: _____

Business Physical Address: _____

Business Mailing Address, if different: _____

Phone: _____ Fax: _____ Email: _____

Bidder's Authorized Signature

Printed Name

Date

**PUBLIC SAFETY BUILDING BOILER REPLACEMENT PROJECT
 BID FORM**

Bidder proposes to furnish all tools, equipment, supplies, manufactured articles, labor and materials, services and incidentals, and to perform all work necessary for the Completion of the Project as shown and specified in strict accordance with the Contract Documents by August 30, 2012.

BASE BID:

Item No.	Approx. Quantity	Pay Item	Unit Price	Amount
1.	All Req'd	Public Safety Building Boiler Replacement including removal of the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boiler, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls.	Lump Sum	\$
Total Bid				
Written Lump Sum				
Company Name: _____ Contact: _____ Address: _____ Phone: _____ email address: _____				

ADDITIVE ALTERNATE #1:

Item No.	Approx. Quantity	Pay Item	Unit Price	Amount
Alt 1.	Lump Sum (LS)	Remove Asphalt Concrete Pavement and Underground Storage Tank, and Replace Underground Steel Tank and Install Leak Monitoring System.	Lump Sum	\$
Per LS				
Total Additive Alternate No. 1 Written				

GRAND TOTAL BASE BID AND ADDITIVE ALTERNATE NO. 1:

\$ _____ (Grand Total Amount In Numbers)
_____ (Grand Total Amount Written)

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT**

NON-COLLUSION AFFIDAVIT

UNITED STATES OF AMERICA)

STATE OF ALASKA)

I, _____ of _____, being duly sworn,
so depose and state:

That I, or the firm, association or corporation of which I am a member, a BIDDER on the contract to be awarded by the Assembly of the HAINES BOROUGH for the delivery of:

PUBLIC SAFETY BUILDING BOILER REPLACEMENT

located in Haines, Alaska, have not, either directly or indirectly entered into any agreement, participate in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

Authorized Signature of Bidder _____

Subscribed and sworn to me this ____ day of _____, **2012**.

Notary Public _____

My Commission Expires: _____

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT**

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned
_____ as Principal and
_____ as Surety,
are hereby held and firmly bound unto the HAINES BOROUGH, as OWNER, in the penal sum of
_____ Dollars (\$_____) for the payment
of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs,
executors, administrators, successors and assigns.

Signed this _____ day of _____, **2012**.

The condition of the above obligation is such that whereas the Principal has submitted to the HAINES BOROUGH, ALASKA a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for: **PUBLIC SAFETY BUILDING BOILER REPLACEMENT**

NOW, THEREFORE

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishing materials or equipment in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety of any and all claims hereunder shall in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, and day and year first set forth above. *Note: Surety companies executing BONDS must appear on the Treasury Department's most current list and be authorized to transact business in Alaska.*

(SEAL) _____
Principal
BY: _____

(SEAL) _____
Surety
BY: _____



HAINES BOROUGH SUBCONTRACTOR REPORT

LIST OF SUBCONTRACTORS

The CONTRACTOR must submit a list of Subcontractors that the CONTRACTOR proposes to use in the performance of this contract. The list must include each Subcontractor's name, address, location, evidence of valid Alaska Business License, and valid Alaska Contractor's Registration under AS 08.18. ***If no Subcontractors are to be utilized in the performance of the WORK, write in ink or type "NONE" on line (1) below.***

<u>SUBCONTRACTOR ADDRESS</u>	¹ AK Contractor License No. ² AK Business License No.	¹ Contact Name ² Phone No.	¹ Type of Work ² Contract Amt.	✓ if DBE
1. _____ _____ _____	1 _____ 2 _____	1 _____ 2 _____	1 _____ 2 _____	<input type="checkbox"/>
2. _____ _____ _____	1 _____ 2 _____	1 _____ 2 _____	1 _____ 2 _____	<input type="checkbox"/>
3. _____ _____ _____	1 _____ 2 _____	1 _____ 2 _____	1 _____ 2 _____	<input type="checkbox"/>
4. _____ _____ _____	1 _____ 2 _____	1 _____ 2 _____	1 _____ 2 _____	<input type="checkbox"/>

I certify that the above listed Alaska Business License(s) and CONRATRACTOR Registration(s), if applicable, were valid at the time of the submission of this report.

CONTRACTOR, Authorized Signature

DATE

CONTRACTOR, Printed Name

- A. A Bidder may replace a listed Subcontractor if the Subcontractor:
1. Fails to comply with AS 08.18;
 2. Files for bankruptcy or becomes insolvent;
 3. Fails to execute a contract with the Bidder involving performance of the WORK for which the Subcontractor was listed and the Bidder acted in good faith;
 4. Fails to obtain bonding;
 5. Fails to obtain insurance acceptable to the owner;
 6. Fails to perform the contract with the Bidder involving work for which the Subcontractor was listed;
 7. Must be substituted in order for the CONTRACTOR to satisfy required state and federal affirmative action requirements;
 8. Refuses to agree or abide with the Bidder's labor agreement; or
 9. Is determined by the OWNER not to be a responsible Bidder.
- B. If a Bidder fails to list a Subcontractor or lists more than one Subcontractor for the same portion of WORK, the Bidder shall be considered to have agreed to perform that portion of WORK without the use of a Subcontractor and to have represented the Bidder to be qualified to perform that WORK.
- C. A Bidder who attempts to circumvent the requirements of this Subcontractor Report by listing as a Subcontractor another contractor who, in turn, sublets the majority of the WORK required under the contract violates this Subcontractor Report.
- D. If a contract is awarded to a Bidder who violates this Subcontractor Report, the OWNER may:
1. Cancel the contract; or
 2. After notice and a hearing, assess a penalty on the Bidder in an amount that does not exceed 10 percent of the value of the subcontract at issue.
- E. For contract award, the apparent low Bidder must submit one copy of each subcontract, to the Borough Manager, for WORK with a value of greater than one half of one percent of the intended award amount.
- F. An apparent low Bidder who fails to submit a completed Subcontractor Report within the time specified in this Subcontractor Report will be found to be not a responsible Bidder and may be required to forfeit the Bid security. The OWNER will then consider the next lowest Bidder for award of the contract.

Contract Forms

**Haines Borough
Public Safety Building Boiler Replacement**

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement is made and entered into this ____ day of _____, **2012** by and between the **Haines Borough**, a municipal corporation organized under the laws of the State of Alaska with its principal place of business at 103 Third Avenue S., Haines, Alaska 99827 ("the Borough") and _____, a _____ (corporation, partnership, individual) with its principal place of business at _____ ("the Contractor"). The Borough and the Contractor are sometimes collectively referred to as "Parties."

The Parties agree as set forth below.

Article I - Contract Documents

1.1 The Contract Documents consist of this Agreement, the Request for Proposals, any Information for Bidders, the Contractor's Proposal, Conditions of the Contract (General, Supplemental and other Conditions, if any, including minimum wage rates for public works contracts), any drawings, specifications or approved submittals, all Addenda issued prior to and all modifications issued after execution of this Agreement. These form the Contract and all are as fully a part of the Contract as if attached to this Agreement or repeated herein. If anything in the Contract Documents is inconsistent with this Agreement, the Agreement shall govern.

Article II - The Work

2.1 The Contractor shall provide all labor, materials, supervision, tools and equipment to perform all the work required and described by the Request for Proposals to provide **the Boiler Replacement at the Public Safety Building**. The Contractor is responsible for being aware of and complying with all applicable local, state, and federal laws.

Article III - Time of Commencement and Contract Term

3.1 The work to be performed under this Contract shall be commenced within ten (10) calendar days of receipt by the Contractor of the Notice to Proceed, and, subject to authorized adjustments, substantial completion shall be achieved not later than **August 20, 2012**. Final completion shall be achieved not later than **August 30, 2012**.

Article IV – Liquidated Damages

4.1 The Borough and Contractor recognize that time is of the essence of this Agreement and that the Borough will suffer financial loss if the work is not completed within the time specified in Article III herein, plus any extensions thereof. They also recognize the delays, expense, and difficulties involved in proving in a legal proceeding the actual damages suffered by the owner if the work is not completed on time. Accordingly, instead of requiring any such proof, the Borough and Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the Borough \$250.00 for each day that expires after the completion time specified in Article III herein. The amount of liquidated damages specified above is agreed to be a reasonable estimate based on all facts known as of the date of this Agreement.

Article V - Cost of the Work

5.1 The Contractor agrees to submit periodic invoices for work performed, and the Borough agrees to pay the Contractor an amount not to exceed \$ _____, subject to any negotiated changes in the work that might increase or decrease the contract amount.

Article VI - Changes in the Work

6.1 The Borough may make changes in the work as provided in the Contract Documents. The Contractor may be reimbursed for changes in the work on the basis of negotiations between the Borough and the Contractor. The Contractor may be reasonably compensated for profit and overhead on changed work items.

Article VII - Retainage

7.1 The Borough shall retain ten percent (10%) of all payments to the Contractor pending satisfactory completion of the work and acceptance of the work by the Borough.

**Haines Borough
Public Safety Building Boiler Replacement**

AGREEMENT BETWEEN OWNER AND CONTRACTOR

Page 2 of 2

Article VIII - Subcontracts and Other Agreements

8.1 The Borough shall be notified in advance by the Contractor of any work being contemplated for assignment to any sub-contractors and shall approve such tasks being contemplated prior to commencement of any sub-contractor work. The Borough reserves the right to reject or modify any sub-contract assignments, through direction to the Contractor.

8.2 All subcontracts shall conform to the requirements of the Contract Documents.

Article IX - Insurance

9.1 The Contractor and all sub-contractors shall maintain the following types of insurance coverage when appropriate:

- a) General Liability
- b) Worker's Compensation, as appropriate under State Law
- c) Automobile Liability

Article X - Payments to the Contractor

10.1 The Contractor may submit periodic payment requests for work performed during the contract period. The Borough shall review the Contractor's payment requests and, subject to that review, promptly recommend the amount for payment. Such amounts shall be payable by the Borough according to its regular accounts payable schedule. Final payment for the work shall be handled in the same manner, subject to the retainage provisions of Article VII.

Article XI - Termination of Contract

11.1 The Borough retains the right to terminate the contract at any time for any reason, at the convenience of the Borough. If the Borough terminates the contract, he shall reimburse the contractor for any unpaid cost of the work due him. The Borough shall also pay to the contractor fair compensation, either by purchase or rental, for any equipment retained. The Borough shall further assume and become liable for obligations, commitments and unsettled claims that the contractor has previously undertaken or incurred in good faith in connection with the work. The Contractor shall assign all interests or rights as the Borough may require for the purpose of vesting in the Borough the rights and benefits of the Contractor under such obligations or commitments.

Article XII - Miscellaneous Provisions

12.1 The Borough's representative under this agreement shall be the Borough Manager.

This Agreement entered into as of the day and year first written above.

BOROUGH

CONTRACTOR

Mark Earnest, Borough Manager
Haines Borough

Signed: _____

Printed Name: _____

Title: _____

Company Name: _____

Attest:

Julie Cozzi, Borough Clerk

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT**

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we _____, a _____
(Name of Contractor) (Corporation, Partnership, Individual)

hereinafter called "Principal" and

_____ of _____,
(Surety) (Address/State)

hereinafter called the "Surety",

are held and firmly bound unto the HAINES BOROUGH, hereinafter called "OWNER", in the penal sum of _____ dollars (\$_____) in lawful money of the united States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal has or is about to enter into a certain contract with the OWNER, a copy of which is hereto attached and made a part hereof for:

Public Safety Building Boiler Replacement

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

PROVIDED, FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed hereunder or the specifications accompanying the same shall in any wise affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or the specifications.

PROVIDED, FURTHER, that no final settlement between the OWNER and the principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT
PERFORMANCE BOND**

IN WITNESS WHEREOF, this instrument is executed in two (2) counterparts, each one of which shall be deemed an original, this the ____ day of _____, **2012**.

ATTEST: _____ (Principal)

(Principal's) Corporate Secretary BY: _____

(Affix CORPORATE SEAL, if applicable) _____
Address - Zip Code

Witness as to Principal

Address - Zip Code

ATTEST: _____ (Surety)

(Surety) Secretary BY: _____
Attorney-in-fact

(Affix SURETY'S SEAL) _____
Address - Zip Code

Witness as to Surety

Address - Zip Code

Note: if principal is partnership, all partners must execute bond.

Important: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

This Performance Bond must comply with AS 36.25.010(a)(1) a performance bond with a corporate surety qualified to do business in the state, or at least two individual sureties who shall each justify in a sum equal to the amount of the bond; the amount of the performance bond shall be equivalent to the amount of the payment bond;

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT
PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we _____, a
(name of CONTRACTOR)

_____ hereinafter called "Principal" (Corporation, Partnership,
Individual)

and _____ of _____,
(Surety)

State of _____ hereinafter called the

"Surety " are held and firmly bound unto The HAINES BOROUGH

hereinafter called "OWNER", in the penal sum of _____

_____ dollars (\$_____)

in lawful money of the united States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal has or is about to enter into a certain contract with the OWNER, a copy of which is hereto attached and made a part hereof for:

Public Safety Building Boiler Replacement

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for, or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools consumed or used in connection with the construction of such work, and all insurance premiums on said work and for all labor performed in such work, whether by subCONTRACTOR or otherwise, then this obligation shall be void: otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed hereunder or the specifications accompanying the same shall in any wise affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alternation or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT
PAYMENT BOND**

IN WITNESS WHEREOF, this instrument is executed in two (2) counterparts, each one of which shall be deemed an original, this the ____ day of _____, **2012**.

ATTEST:

(Principal)

(Principal's) Corporate Secretary

(Affix CORPORATE SEAL, if applicable)

BY: _____

Address - Zip Code

Witness as to Principal

Address - Zip Code

ATTEST:

(Surety)

(Surety) Secretary

(Affix SURETY'S SEAL)

BY: _____

(Attorney-in-fact)

Address - Zip Code

Witness as to Surety

Address - Zip Code

Note: Date of Bond must not be prior to date of Contract. If principal is partnership, all partners must execute bond.

Important: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

This Payment Bond must comply with AS 36.25.010(a)(2) a payment bond with a corporate surety qualified to do business in the state, or at least two individual sureties who shall each justify in a sum equal to the amount of the bond for the protection of all persons who supply labor and material in the prosecution of the work provided for in the contract; **when the total amount payable by the terms of the contract is not more than \$1,000,000, the payment bond shall be in a sum of one-half the total amount payable by the terms of the contract;** when the total amount payable by the terms of the contract is more than \$1,000,000 and not more than \$5,000,000, the payment bond shall be in a sum of 40 percent of the total amount payable by the terms of the contract; when the total amount payable by the terms of the contract is more than \$5,000,000, the payment bond shall be in the sum of \$2,500,000.

General Conditions

**HAINES BOROUGH
PUBLIC SAFETY BUILDING BOILER REPLACEMENT
GENERAL CONDITIONS**

DEFINITIONS

AGREEMENT – the written contract between Owner and the Contractor covering the work to be performed.

BONDS – Bid, Performance and Payment Bonds and other instruments which protect against loss due to inability or refusal of the Contractor to perform its contract.

CHANGE ORDER – a document signed by the contractor and the owner, authorizing an addition, deletion or revision in the work, or an adjustment in the contract price or time, issued on or after the effective date of the agreement.

CONTRACTOR – The individual, partnership, corporation, joint-venture or other legal entity with whom the Owner has executed the Agreement.

INSPECTOR – The Project Manager

NOTICE TO PROCEED – The written notice issued by the Owner to the Contractor authorizing the Contractor to proceed with the work and establishing the date of commencement of the Contract.

OWNER – The Haines Borough, acting through its legally designated officials, officers or employees.

PROJECT MANAGER – Brian Lemcke, Facilities Director, Haines Borough; Telephone: (907) 766-2257; cell (907) 314-0648

PRELIMINARY MATTERS

1. Delivery of Documents. Insurance Certificates shall be delivered to the Owner with the signed Agreement.

INSURANCE

Without limiting the Contractor's indemnification, it is agreed that the Contractor shall purchase at its own expense and maintain in force at all times during the performance of services under Contract the following policies of insurance. Where specific limits are shown, it is understood that they shall be the minimum acceptable limits. If the Contractor's policy contains higher limits, the Haines Borough shall be entitled to coverage to the extent of such higher limits. Failure to maintain insurance is a material breach and grounds for termination of the Contractor's services.

- (a) Worker's Compensation Insurance: The Contractor shall provide and maintain, for all employees of the Contractor engaged in work under this Contract, Worker's Compensation Insurance as required by AS 23.30.045. The Contractor shall be responsible for Worker's Compensation Insurance for any subcontractor who directly or indirectly provides services under this Contract. If the Contractor does not have employees, this insurance requirement is waived.
- (b) General Liability Insurance: The Contractor must maintain General Liability Insurance in an amount sufficient to cover any suit that may be brought against the Contractor. This amount must be at least five-hundred thousand dollars (\$500,000) combined single limit. The Contractor must assume all insurable risks and bear any loss or injury to property or persons occasioned by neglect or accident during the terms of this Contract, except for sole negligence on the part of the Borough.
- (c) Comprehensive Automobile Liability Insurance: Covering all vehicles utilized in connection with this project with coverage limits not less than \$100,000 per person, \$300,000 per occurrence bodily injury, and \$50,000 Property damage.

ALASKA LABOR STANDARDS, REPORTING, AND PREVAILING WAGE RATE DETERMINATION

State of Alaska, Department of Labor, Laborers' and Mechanics' Minimum Rates of Pay, AS 36.05.010 and AS 36.05.050, Wage and Hour Administration Pamphlet No. 600, the latest edition published by the State of Alaska, Department of Labor inclusive, are made a part of the contract by reference.

The CONTRACTOR is responsible for contacting the Alaska Department of Labor to determine compliance with current regulations.

Required Reporting During Contract (to be provided by every CONTRACTOR and Subcontractor):

- A. Certified Payrolls must be submitted every two weeks. Before the second Friday, each CONTRACTOR and Subcontractor must file Certified Payrolls with Statements of Compliance for the previous two weeks. If there was no activity for that pay period, indicate "No Activity." Indicate "Start" on your first payroll, and "Final" on your last payroll for this Project. Send to:

Wage and Hour Section

State of Alaska

Department of Labor and Workforce Development

Labor Standards and Safety Division

P.O. Box 21149

Juneau, AK 99802-1449

(907) 465-4842

Haines Borough

Attn: Borough Clerk

P.O. Box 1209

Haines, AK 99827

(907) 766-2231

- B. Within 5 Business Days of the bid date, the apparent low bidder is required to make a list of all Subcontractors. Include their name, address, phone, estimated subcontract amount, and estimated start and finish dates. Send to:

Wage and Hour Section

State of Alaska

Department of Labor and Workforce Development

Labor Standards and Safety Division

P.O. Box 21149

Juneau, AK 99802-1449

(907) 465-4842

Haines Borough

Attn: Borough Clerk

P.O. Box 1209

Haines, AK 99827

(907) 766-2231

OWNERS REPRESENTATIVE/COMMUNICATIONS

The Owner's Representative is the Project Manager, Brian Lemcke, Facilities Director. The Owner shall issue all its communications to the Contractor through the Project Manager or his designee. The Contractor shall issue all its communications to the Owner through the Project Manager or his designee.

CHANGE ORDERS

Without invalidating the Agreement and without notice to any surety, the Owner may at any time of from time to time, order additions, deletions or revisions in the work; these will be authorized by a written Change Order. Appropriate Change Orders may cover:

1. changes in the work;
2. changes required because of acceptance of defective work;
3. changes in the contract price or contract time which are agreed to by the parties; or
4. changes in the contract price or contract time which are the result of any written decision

rendered by the Engineer.

PAYMENT SCHEDULE

The Contractor may submit periodic payment requests for work performed during the contract period. The Borough shall review the Contractor's payment requests and, subject to that review, promptly recommend the amount for payment. Such amounts shall be payable by the Borough according to its regular accounts payable schedule. Final payment for the work shall be handled in the same manner, subject to the retainage provisions.

WARRANTY; TEST & INSPECTIONS: CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

The Contractor shall give the Project Manager timely notice of readiness of the work for inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate the inspections or tests.

The Project Manager will make such inspections and tests as the Project Manager deems necessary to see that the work is being accomplished in accordance with the contract documents. The costs of the tests will be borne by the Owner unless otherwise specified.

If the work is defective, or the Contractor fails to perform work in such a way that the completed work will conform to the contract documents, the Owner may order the Contractor to stop the work until the cause for such order has been eliminated. If required by the Project Manager, the Contractor shall promptly, either correct all defective work, whether or not fabricated, installed or completed, or, if the work has been rejected by the Project Manager, remove it from the site and replace it with non-defective work. The Contractor shall bear all direct, indirect and consequential costs and damages of such correction or removal.

Specifications

SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 GENERAL

- A. The WORK to be performed under this contract shall consist of furnishing all plant, tools, equipment, materials, supplies, manufactured articles, labor, transportation and services, including fuel, power, water, and essential communications, and performing all WORK, or other operations required for the fulfillment of the contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work materials and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY THE CONTRACT DOCUMENTS

- A. The WORK includes removal of the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boiler, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls. Alternate WORK includes removal of asphalt concrete pavement and underground storage tank, and replace underground steel tank and install leak monitoring system.

1.3 SITE OF THE WORK

- A. The site of the WORK is located in Haines, Alaska at the Public Safety Building located at 213 Haines Highway.

1.4 BEGINNING AND COMPLETION OF THE WORK

- A. Time is of the essence of the contract. All WORK shall be completed in accordance with the following schedule.

<u>WORK DESCRIPTION</u>	<u>COMPLETION DATE</u>
Substantial Completion	August 15, 2012
All WORK under the Contract Documents	August 30, 2012

1.5 CONTRACT METHOD

- A. The WORK hereunder will be constructed under a unit-price contract.

1.6 CONTRACTOR USE OF PROJECT SITE

- A. The CONTRACTOR's use of the Project site shall be limited to its construction operations, including on-site storage of materials. The CONTRACTOR shall coordinate with the Public Facilities Director for confirmation of final staging area limits.

1.7 OWNER USE OF THE PROJECT SITE

- A. The OWNER may utilize all or part of the existing site during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate and coordinate with the ENGINEER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Project site during the period of construction.

PART 2 - PAY ITEMS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01025 – MEASUREMENT AND PAYMENT ITEMS

PART 1 - GENERAL

1.1 SCOPE

- A. Payment for the various items of the Bid Schedule, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of WORK being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA) and Occupational Safety and Health Standards of the Alaska Department of Labor, Division of Labor Standards and Safety.
- B. No separate payment will be made for any pay item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of WORK.

PART 2 - PAY ITEMS

2.1 REMOVE AND REPLACE BOILER AND ASSOCIATED EQUIPMENT AS DESCRIBED IN DIVISION 15.

- A. Measurement for payment for Public Safety Building Boiler Replacement including removal of the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boiler, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls will be based upon the completion of the entire WORK as a Lump Sum Pay Unit, or as otherwise approved by the ENGINEER.
- B. Work under this pay item includes: all labor, all required submittals, equipment, and materials necessary to remove the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and install one oil-fired boiler, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls.
- C. Payment for Remove and Replace Boiler and Associated Equipment will be made at the Unit Price named in the Bid Schedule under Base Bid Item No. 1, which payment will constitute full compensation for all WORK described in Division 15, as shown on the plans and as directed by the ENGINEER.

2.2 REMOVE ASPHALT CONCRETE PAVEMENT AND UNDERGROUND STORAGE TANK, AND REPLACE UNDERGROUND STEEL TANK AND INSTALL LEAK MONITORING SYSTEM, PRICE BASED ON LUMP SUM

- A. Measurement for payment for Remove Asphalt Concrete Pavement and Underground Storage

Tank, and Replace Underground Steel Tank and Install Leak Monitoring System will be based upon the completion of the entire WORK as a Lump Sum Pay Unit, complete, including submission of confirmation sample results to the Alaska Department of Environmental Conservation, all in accordance with the requirements of the Contract Documents.

- B. WORK under this pay item includes: all labor, all required submittals, equipment, and materials necessary to remove existing asphalt pavement, remove and dispose of the UST and associated piping, including pumping and disposal of sludges, all activities and costs necessary for disposal of the tank and associated piping; collection and analysis of clearance samples; all labor, all required submittals, equipment, and materials necessary to install a new underground steel tank and associated piping; install a leak monitoring system; and backfill and compact the resulting excavations as necessary with suitable uncontaminated native Backfill Material, place and compact any necessary Imported Backfill, place and compact Base Course over compacted Imported Backfill. OWNER to supply and install concrete cover.
- C. Payment for Underground Storage Tank Removal will be made at the amount shown on the Bid Schedule under Alternate No. 1, which payment will constitute full compensation for all WORK described in Section 02203 – IMPORTED BACKFILL, Section 02204 - BASE COURSE, Section 02806 – REMOVE EXISTING ASPHALT SURFACING, Section 13010 – UNDERGROUND STORAGE TANK REMOVAL, and pertinent Sections of Division 15, and as shown on the Drawings and as directed by the ENGINEER.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02203 – IMPORTED BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions;
- B. Division 1 through Division 15 Specification Sections;
- C. Contract drawings, particularly drawing M601.

1.2 SUMMARY

- A. The WORK under this section includes providing all labor, materials, tools and equipment necessary for the procurement and placement of backfill required after removal of structures, pipelines, vaults, foundations, and other appurtenances; and for preparing the grade for application of Base Course.
- B. Bedding, Class B, shall be three inch minus material, free of muck, frozen material, lumps, organic material, trash, lumber or other debris, with no more than 10% passing the #200 screen.

PART 2 - PRODUCTS

2.1 IMPORTED BACKFILL

- A. Imported backfill shall be granular material, free draining, free of muck, frozen material, lumps, or organic material and shall conform to the following gradation:

SIEVE DESIGNATION	PERCENT PASSING BY WEIGHT
3"	100
No. 4	20-70
No. 200	0-8

PART 3 - EXECUTION

3.1 GENERAL

- A. The CONTRACTOR shall protect and preserve all existing pavement throughout the entire construction period. No tracked equipment may be operated on any pavement without first protecting the pavement with pavement pads approved by the ENGINEER. All pavement which is damaged in any manner by the CONTRACTOR's operations shall be restored to original or better condition at the CONTRACTOR's expense.
- B. Where required to prevent caving of the trench, or by any safety law or regulation, the CONTRACTOR shall furnish and install bracing and/or sheeting to protect the excavation. This bracing and/or sheeting shall be removed as trench backfill progresses.
- C. The CONTRACTOR shall remove and dispose of all water entering the excavation. Disposal of water shall be done in a manner to prevent damage or nuisance to adjacent property, and in accordance with all applicable laws and regulations.
- D. The CONTRACTOR shall provide temporary support of existing structures, as necessary to protect the structures from settlement or other disturbances caused by construction activities. All structures disturbed by the CONTRACTOR's activities shall be returned to original condition, or better.

3.2 BACKFILL

- A. Backfilling of the crawl space and other voids left by the removal of porches, decks, fuel tanks, and ramps shall be completed utilizing imported backfill. The backfill shall be compacted to 95% of optimum density, as determined by AASHTO T 180-D. Lifts shall not exceed eight inches in depth for loose material.
- B. At least 24 hours prior to commencing backfilling operations, the CONTRACTOR shall notify the ENGINEER of the proposed method of compaction. No method will be approved until the CONTRACTOR has demonstrated, under actual field conditions, that such method will produce the degree of compaction required.
- C. The initial density test at any location will be paid for by the Haines Borough. If the initial test shows that the material compaction is not as specified, the CONTRACTOR shall modify the compaction methods used, as approved by the ENGINEER, and have the material retested until the tests show that the compaction meets the specification requirements. All tests, after the initial test at any given location, shall be paid for by the CONTRACTOR.

END OF SECTION 02203

SECTION 02203 – BASE COURSE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions;
- B. Division 1 through Division 13 Specification Sections;
- C. Contract drawings.

1.2 DESCRIPTION

- A. The work under this section includes providing all labor, materials, tools and equipment necessary for furnishing and placing one or more layers of aggregate base or leveling course on a prepared surface to the lines and grades shown on the Plans.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Aggregate base course shall consist of crushed gravel or crushed stone, conforming to the quality requirements of AASHTO M 147. The aggregate shall be free from lumps, balls of clay, or other objectionable matter, and shall be durable and sound.
- B. Base course material shall conform to the gradation specified as D-1:

BASE COURSE GRADATIONS (Percent passing by weight)								
Sieve Designation	A	B	C	C-1	D	D-1	E	E-1
4	100							
2	85-100	100						
1 ½				100				
1			100	70-100		100		
¾				60-90	100	70-100		100
3/8				45-75		50-80		
#4	30-70	30-70	40-75	30-60	45-80	35-65		45-80
#8				22-52		20-50		32-80
#10			25-55		30-65			
#40				8-30		8-30		
#200	0-10	3-10	4-10	0-6	4-12	0-6	0-6	0-6

- C. A least 70% by weight of the particles retained on a No. 4 sieve shall have at least one fractured face as determined by Alaska T-4.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. Prior to placement of the base course, the underlying surface shall be prepared by dressing, shaping, wetting or drying, and compacting of the underlying material to a minimum density of 95% per AASHTO T 180-D. Surfaces shall be cleaned of all foreign substances and debris.
- B. Any ruts or soft yielding spots that may appear shall be corrected by loosening and removing unsatisfactory material and adding approved material as required, reshaping, and recompacting the affected areas to the lines and grades indicated on the Plans. If required by the ENGINEER, the CONTRACTOR shall proof load questionable areas with a loaded truck or other piece of equipment approved by the ENGINEER.
- C. Base course material shall be deposited and spread in a uniform layer to the required grades, and to such loose depth that when compacted to the density required, the thickness will be as indicated on the Plans. Portions of the layer which become segregated shall be removed and replaced with a satisfactory mixture, or shall be remixed to the required gradation.
- D. The maximum compacted thickness of any one layer shall not exceed six inches. If the required compacted depth exceeds six inches, the base shall be constructed in two or more layers of approximately equal thickness. Each layer shall be shaped and compacted before the succeeding layer is placed.
- E. The base course shall be compacted to at least 95% of maximum density as determined by AASHTO T 180-D. In places not accessible to rolling equipment, the mixture shall be compacted with hand tamping equipment.
- F. Blading, rolling, and tamping shall continue until the surface is smooth and free from waves and irregularities. If at any time the mixture is excessively moistened, it shall be aerated by means of blade graders, harrows, or other approved equipment, until the moisture content is such that the surface can be recompacted and finished as above.
- G. The finished surface of the base course, when tested using a 10-foot straightedge, shall not show any deviation in excess of 3/8-inch between two contact points. The finish surface shall not vary more than 1/2-inch from established grade. Additionally, the algebraic average of all deviations from established grade of the finish base course surface elevations taken at 50-foot intervals shall be less than 0.02-foot.
- H. The initial density test at any location will be paid for by the Haines Borough. If the initial test shows that the material compaction is not as specified, the CONTRACTOR shall modify the compaction methods used, as approved by the ENGINEER, and have the material retested until the tests show that the compaction meets the specification requirements. All tests, after the initial test at any given location, shall be paid for by the CONTRACTOR.

END OF SECTION 02204

SECTION 02806 – REMOVE EXISTING ASPHALT SURFACE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary to remove existing asphalt surfacing as shown on the Drawings and Standard Details or as directed by the ENGINEER.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall conform to the requirements of the Section 02801 AC Pavement, of these documents, or to the requirements of the agency having jurisdiction over the pavement being replaced.

PART 3 - EXECUTION

3.1 GENERAL

- A. Asphalt Pavement to be removed shall be neatly saw cut full depth along straight lines, with a tolerance of 0.1 feet in 50 feet and 0.2 feet in 100 feet. Only such pavement shall be removed as is necessary to excavate for the appurtenances, but the pavement shall be cut a sufficient distance outside the excavation to prevent damage to adjacent pavement by lifting or tearing the mat. All removed pavement shall be disposed of off the project at an approved disposal site.
- B. The CONTRACTOR shall deliver the removed asphalt surfacing material to the asphalt disposal stockpile designated by the Haines Borough. The CONTRACTOR shall stack the material with a loader if required by the ENGINEER.
- C. If the CONTRACTOR fails to comply with the provisions of any Borough ordinance or permit pertaining to waste disposal or disposal sites; the OWNER shall have the right, after giving 30 days written notice, to bring the disposal sites into compliance and collect the cost of the WORK from the CONTRACTOR, either directly or by withholding monies otherwise due under the contract.

END OF SECTION 02806

SECTION 15010 – UNDERGROUND STORAGE TANK REMOVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions;
- B. Division 1 through Division 15 Specification Sections;
- C. Contract drawings, particularly drawing M601.

1.2 SUMMARY

A. BACKGROUND

- 1. The work is in support of the Haines Public Safety Building Heating Plant Renovation Project in Haines, Alaska. The Haines Public Safety Building is currently served by a 25-year-old 1000-gallon single-wall steel underground storage tank (UST) which shall be removed and disposed of as Alternate No. 1 of the project.

1.3 SCOPE OF WORK

- A. **UNDERGROUND STORAGE TANK REMOVAL** shall include all labor, all required submittals, equipment, and materials necessary to: remove the asphalt concrete pavement for excavation of the tank; remove and dispose of the UST and associated piping, ballast, hold-down ties, and appurtenances, including everything necessary to pump out and dispose of sludges; remove, clean, cut up and dispose of the tank and associated piping; collect and analyze clearance samples; and backfill the resulting excavations as necessary with suitable uncontaminated Backfill Material. It is assumed for bidding purposes that up to 10 cubic yards of contaminated soil will be encountered.
- B. Should more than 10 cubic yards of contaminated soils be encountered, a change order will be negotiated to pay for labor, equipment, and materials necessary to remove, transport and dispose of the material, and backfill the resulting excavations with suitable uncontaminated Backfill Material.
- C. All WORK shall be in accordance with these contract documents and applicable state and local regulations.

1.4 COORDINATION OF UST REMOVAL ACTIVITIES

- A. Removal of product and sludge from the existing UST is the responsibility of the CONTRACTOR.

- B. Alaska Department of Environmental Conservation (ADEC) UST Regulations (18 AAC 78) dated January 22, 1999 and ADEC UST Procedures Manual dated December 10, 1998 shall be used for guidance for UST removal work (including assessment of any contaminated soil encountered during tank work).

1.5 SUBMITTALS

- A. Pre-Job:
 - 1. Tank and Piping Removal and Disposal Plan: The CONTRACTOR shall submit a brief Tank and Piping Removal and Disposal Plan that describes methods and schedule for cleaning, inerting, inspecting, removing, and disposing of the UST and all associated piping, and for collecting and analyzing UST clearance samples. Refer to PART 3 "EXECUTION" below for specific requirements that must be addressed in the plan.
 - 2. Site Specific Health and Safety Plan (HASP): The CONTRACTOR shall submit a HASP that briefly describes safety and health plans and procedures specific to this project. The HASP shall be developed in accordance with the following outline:
 - a. Site Specific Information
 - b. Project Objectives
 - c. Chemical Hazards
 - d. Safety & Health Analysis
 - e. Project Organization
 - f. Emergency Assistance Information
 - g. Non-emergency Assistance Information
 - h. Tailgate Safety Meeting Form
 - i. Comprehensive Information
 - j. Anticipated Hazards & Risk Prevention
 - k. Responsibilities of Project Personnel
 - l. Personnel Training
 - m. Medical Surveillance Program
 - n. Personal Protective Equipment
 - o. Health Hazard Assessment
 - p. Site Control Procedures
 - q. Decontamination Procedures
- B. During Job:
 - 1. Release Notification: The CONTRACTOR shall notify ADEC and the ENGINEER in writing within 24 hours after any discovery of contamination, whether identified by direct observation or by lab results.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIAL

- A. Backfill shall be non-frost susceptible, granular material that is free of rocks larger than six inches, mulch, frozen material, lumps, organic material, trash, lumber, or other debris, and shall meet the requirements of Section 02203, Imported Backfill, of this contract.

PART 3 - EXECUTION

3.1 GENERAL

- A. Each person on the crew shall have completed a 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course, and have proof that their HAZWOPER Refresher Training is current.
- B. The CONTRACTOR shall provide an individual or firm who will perform the following activities in accordance with ADEC's UST Procedures Manual.
 - 1. Collect clearance soil samples from the assumed clean closure.
 - 2. Procure 14-day turn around lab analysis of soil samples, review lab results, and submission of the sample results to the ENGINEER.

3.2 TANK AND PIPING REMOVAL

- A. Prior to excavation the CONTRACTOR shall conduct an on-site investigation to determine location and size of existing utilities or hazards in the digging area.
- B. The CONTRACTOR shall not operate valves or similar components of existing systems without the advance written approval of the ENGINEER.
- C. The CONTRACTOR shall submit a written request to the ENGINEER for any scheduled utility outages affecting adjacent buildings or properties, (such as water, electrical, sanitary sewer, or storm water). The written request shall specify the type of utility, reason for outage, and the estimated length of the proposed outage. Utility outages shall be requested 7 days in advance. Permission and duration of outages will be granted by the ENGINEER based upon the need for the utility and upon consideration of suitable bypasses or alternate arrangements.
- D. The CONTRACTOR shall remove and exclude water uncontaminated by petroleum hydrocarbons as needed to perform the work required under this CONTRACT (including storm water, ground water, and wastewater) from all excavations. Methods used may include dewatering wells, well points, sump pumps, or other means to remove water as needed. Water shall be removed and excluded until backfilling is complete and all field soil testing has been completed.
- E. The CONTRACTOR shall report any petroleum hydrocarbon-contaminated water encountered in the excavation to the ENGINEER. If the CONTRACTOR needs to dewater an excavation that has water contaminated with petroleum hydrocarbons, the CONTRACTOR shall remove and dispose of such contaminated water in accordance with all local, state and federal laws and regulations at sites and facilities provided by the CONTRACTOR.
- F. OSHA-approved safety fencing is required around all excavations to effectively isolate the construction area from access to passers-by. Such fencing shall surround any excavations left unattended.

3.3 TANK CLEANING

- A. Prior to disposal the CONTRACTOR shall clean each tank to remove all remaining liquids and sludges in accordance with the submitted and approved "Tank and Piping Removal and Disposal Plan".
- B. Cleaning and tank atmosphere testing shall be in accordance with API RP-1604, "Cleaning Petroleum Storage Tanks". All piping to be removed shall be cleaned to similar standards. The CONTRACTOR shall test the tank atmosphere and the excavation area for flammable or combustible vapor concentrations with a combustible gas indicator until the tank is removed from the excavation and site.

3.4 TANK DISPOSAL

- A. Tank disposal shall occur at a facility approved by ADEC to accept fuel storage tanks. The CONTRACTOR shall obtain any permits and pay all fees required for the disposal.

3.5 EXCAVATION BACKFILL

- A. Backfill shall be compacted in lifts no greater than 18", to 95% of optimum density as determined by AASHTO T 180 D.

3.6 CLEARANCE SAMPLING

- A. Two clearance samples shall be collected from the bottom of the UST excavation and at least one additional sample collected from under buried pipelines. Samples shall be analyzed for DRO (AK 102) and BTEX (AK101/8021B or 8260B).
- B. If contaminated soil is encountered consult the ENGINEER for direction.

END OF SECTION 13010

SECTION 15010 – UNDERGROUND STORAGE TANK REMOVAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of the Contract, including General and Supplementary Conditions;
- B. Division 1 through Division 15 Specification Sections;
- C. Contract drawings, particularly drawing M601.

1.2 SUMMARY

A. BACKGROUND

- 1. The work is in support of the Haines Public Safety Building Heating Plant Renovation Project in Haines, Alaska. The Haines Public Safety Building is currently served by a 25-year-old 1000-gallon single-wall steel underground storage tank (UST) which shall be removed and disposed of as Alternate No. 1 of the project.

1.3 SCOPE OF WORK

- A. UNDERGROUND STORAGE TANK REMOVAL shall include all labor, all required submittals, equipment, and materials necessary to: remove the asphalt concrete pavement for excavation of the tank; remove and dispose of the UST and associated piping, ballast, hold-down ties, and appurtenances, including everything necessary to pump out and dispose of sludges; remove, clean, cut up and dispose of the tank and associated piping; collect and analyze clearance samples; and backfill the resulting excavations as necessary with suitable uncontaminated Backfill Material. It is assumed for bidding purposes that up to 10 cubic yards of contaminated soil will be encountered.
- B. Should more than 10 cubic yards of contaminated soils be encountered, a change order will be negotiated to pay for labor, equipment, and materials necessary to remove, transport and dispose of the material, and backfill the resulting excavations with suitable uncontaminated Backfill Material.
- C. All WORK shall be in accordance with these contract documents and applicable state and local regulations.

1.4 COORDINATION OF UST REMOVAL ACTIVITIES

- A. Removal of product and sludge from the existing UST is the responsibility of the CONTRACTOR.

- B. Alaska Department of Environmental Conservation (ADEC) UST Regulations (18 AAC 78) dated January 22, 1999 and ADEC UST Procedures Manual dated December 10, 1998 shall be used for guidance for UST removal work (including assessment of any contaminated soil encountered during tank work).

1.5 SUBMITTALS

- A. Pre-Job:
 - 1. Tank and Piping Removal and Disposal Plan: The CONTRACTOR shall submit a brief Tank and Piping Removal and Disposal Plan that describes methods and schedule for cleaning, inerting, inspecting, removing, and disposing of the UST and all associated piping, and for collecting and analyzing UST clearance samples. Refer to PART 3 "EXECUTION" below for specific requirements that must be addressed in the plan.
 - 2. Site Specific Health and Safety Plan (HASP): The CONTRACTOR shall submit a HASP that briefly describes safety and health plans and procedures specific to this project. The HASP shall be developed in accordance with the following outline:
 - a. Site Specific Information
 - b. Project Objectives
 - c. Chemical Hazards
 - d. Safety & Health Analysis
 - e. Project Organization
 - f. Emergency Assistance Information
 - g. Non-emergency Assistance Information
 - h. Tailgate Safety Meeting Form
 - i. Comprehensive Information
 - j. Anticipated Hazards & Risk Prevention
 - k. Responsibilities of Project Personnel
 - l. Personnel Training
 - m. Medical Surveillance Program
 - n. Personal Protective Equipment
 - o. Health Hazard Assessment
 - p. Site Control Procedures
 - q. Decontamination Procedures
- B. During Job:
 - 1. Release Notification: The CONTRACTOR shall notify ADEC and the ENGINEER in writing within 24 hours after any discovery of contamination, whether identified by direct observation or by lab results.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIAL

- A. Backfill shall be non-frost susceptible, granular material that is free of rocks larger than six inches, mulch, frozen material, lumps, organic material, trash, lumber, or other debris, and shall meet the requirements of Section 02203, Imported Backfill, of this contract.

PART 3 - EXECUTION

3.1 GENERAL

- A. Each person on the crew shall have completed a 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) course, and have proof that their HAZWOPER Refresher Training is current.
- B. The CONTRACTOR shall provide an individual or firm who will perform the following activities in accordance with ADEC's UST Procedures Manual.
 - 1. Collect clearance soil samples from the assumed clean closure.
 - 2. Procure 14-day turn around lab analysis of soil samples, review lab results, and submission of the sample results to the ENGINEER.

3.2 TANK AND PIPING REMOVAL

- A. Prior to excavation the CONTRACTOR shall conduct an on-site investigation to determine location and size of existing utilities or hazards in the digging area.
- B. The CONTRACTOR shall not operate valves or similar components of existing systems without the advance written approval of the ENGINEER.
- C. The CONTRACTOR shall submit a written request to the ENGINEER for any scheduled utility outages affecting adjacent buildings or properties, (such as water, electrical, sanitary sewer, or storm water). The written request shall specify the type of utility, reason for outage, and the estimated length of the proposed outage. Utility outages shall be requested 7 days in advance. Permission and duration of outages will be granted by the ENGINEER based upon the need for the utility and upon consideration of suitable bypasses or alternate arrangements.
- D. The CONTRACTOR shall remove and exclude water uncontaminated by petroleum hydrocarbons as needed to perform the work required under this CONTRACT (including storm water, ground water, and wastewater) from all excavations. Methods used may include dewatering wells, well points, sump pumps, or other means to remove water as needed. Water shall be removed and excluded until backfilling is complete and all field soil testing has been completed.
- E. The CONTRACTOR shall report any petroleum hydrocarbon-contaminated water encountered in the excavation to the ENGINEER. If the CONTRACTOR needs to dewater an excavation that has water contaminated with petroleum hydrocarbons, the CONTRACTOR shall remove and dispose of such contaminated water in accordance with all local, state and federal laws and regulations at sites and facilities provided by the CONTRACTOR.
- F. OSHA-approved safety fencing is required around all excavations to effectively isolate the construction area from access to passers-by. Such fencing shall surround any excavations left unattended.

3.3 TANK CLEANING

- A. Prior to disposal the CONTRACTOR shall clean each tank to remove all remaining liquids and sludges in accordance with the submitted and approved "Tank and Piping Removal and Disposal Plan".
- B. Cleaning and tank atmosphere testing shall be in accordance with API RP-1604, "Cleaning Petroleum Storage Tanks". All piping to be removed shall be cleaned to similar standards. The CONTRACTOR shall test the tank atmosphere and the excavation area for flammable or combustible vapor concentrations with a combustible gas indicator until the tank is removed from the excavation and site.

3.4 TANK DISPOSAL

- A. Tank disposal shall occur at a facility approved by ADEC to accept fuel storage tanks. The CONTRACTOR shall obtain any permits and pay all fees required for the disposal.

3.5 EXCAVATION BACKFILL

- A. Backfill shall be compacted in lifts no greater than 18", to 95% of optimum density as determined by AASHTO T 180 D.

3.6 CLEARANCE SAMPLING

- A. Two clearance samples shall be collected from the bottom of the UST excavation and at least one additional sample collected from under buried pipelines. Samples shall be analyzed for DRO (AK 102) and BTEX (AK101/8021B or 8260B).
- B. If contaminated soil is encountered consult the ENGINEER for direction.

END OF SECTION 13010

SECTION 15010 – GENERAL MECHANICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The scope of Work includes a complete renovation of the heating plant for the Haines Public Safety Building. Work includes removal of the existing heating plant, chimney breeching, circulating pumps, electric controls, oil delivery system, and the installation of one oil-fired boilers, circulating pumps, heating piping, oil delivery system, chimney breeching, and electronic controls. Alternate work includes replacement of underground storage fuel tank.
- B. The Mechanical Work is governed by the entire Specifications and not just Division 15. The entire Specifications must be examined for requirements relating to the Work hereunder. The Work covered by this and all other Mechanical sections consists of furnishing labor, equipment, and materials in accordance with the Specifications or Drawings, or both, together with any incidental items not shown or specified which can be reasonably inferred or taken as belonging to the Work and necessary in good practice to provide a complete system described or shown as intended.
- C. Coordinate shutdown of systems with Maintenance Personnel. Contact name and phone number will be available through OWNER.
- D. Continuity of Mechanical Systems for Building: The work is anticipated to occur during the summer months and not during the winter season. Therefore temporary heating and continuity of the Mechanical systems is not required until start of the winter season.
- E. Demolition of and Connection to Existing Material, Equipment, and Systems:
 - 1. Where piping systems are shown to be partially removed for connection, prepare and protect the connection points appropriately to ensure later continuity of Work. CONTRACTOR shall provide all temporary supports as required and completely replace material and equipment that are not suitably protected during construction and becomes damaged.
 - 2. CONTRACTOR shall provide all temporary caps for piping as required. CONTRACTOR shall remove all temporary provisions when the phase of Work is completed or earlier if required.
 - 3. Where items are shown to be removed such as piping it is to be assumed that this includes the removal of the respective system including but not limited to pipe hangers, supports, conduit, wiring, valves, and other related trim and appurtenances. Piping to be removed through a floor assumes that the piping is to be capped below floor and the floor finished smooth.
 - 4. Mechanical Contractor shall locate, isolate, and drain piping systems to be removed.

1.2 WORDING OF THE SPECIFICATIONS

- A. These Specifications are of the abbreviated or streamlined type and frequently include incomplete sentences. However, periods are used for clarity. Words such as "shall", "shall be", "the CONTRACTOR shall", and similar mandatory phrases shall be supplied by inference in the same manner, as they are required for the notes on the drawings.

1.3 CODES AND REGULATIONS

- A. All Work hereunder shall be strictly in conformance with applicable codes and regulations. All Work shall be in accordance with the 2006 Uniform Plumbing Code, 2006 International Mechanical Code, 2006 International Building Code, 2006 International Fire Code, the most recent edition of NFPA, and State of Alaska code modifications insofar as minimum requirements are concerned, but the Drawings and Specifications shall govern in case the minimum requirements are exceeded. All electrical equipment shall bear the UL label.

1.4 SUBMITTALS

- A. General: Provide submittals according to Conditions of Contract, Division 1 Specifications Sections, and as required hereunder. Drawings and general provisions of the Contract, including General, Supplementary Conditions, and all Division 1 Specification Sections, apply to this Section. Approval of the data shall not eliminate responsibility for compliance with the Drawings or Specifications unless specific attention has been called in writing to proposed deviations at the time of transmittal of the data and such deviations have been approved, nor shall it eliminate the responsibility for freedom of errors of any sort in the data. All Mechanical submittal data for Project construction is to be turned in for approval at the same time in order for an efficient review process. Partial submittals may be rejected until the full submittal is received.
- B. Specified Products: Trade names and catalog numbers of manufactured products included herein are intended to indicate the type, size, and grade of quality of equipment and materials required and such equipment and materials are approved for installation, subject to full compliance with the Specifications. Except where single manufacture is specified for standardization, requests for approval of other manufacturers than those specified must be accompanied by complete descriptions including overall dimensions, performance data, and, if catalog material, identification of specific products or items proposed.
- C. Submittal Format: All data shall be submitted at one time in neatly bound loose-leaf three ring binders with pockets and tabulated in the same order of Specification Division 15000 section. All data shall be typed, minimum 10 point font, no exceptions. Data submitted that is not conforming to these specification requirements will be returned without reviewing and will need to be resubmitted at Contractors sole complete cost.
 - 1. Each binder shall have a set of separators with index tabs A to Z. Tabs are to be printed type. Slip-in tabs not acceptable.
 - 2. The first page shall be a cover sheet with project name, address, date, submittal product name, all applicable contractors and contact information, and all applicable consultants and contact information.

3. Second page shall be a submittal manual index of all project Specification sections with respective tab numbers, and respective book number, if applicable.
 4. The first page of each manual's section shall be an index of that respective project Specification section and number with each product name, manufacturer name and model number.
 5. Each manual's section shall be labeled and certified by mechanical Subcontractor that the data presented is in accordance with project Specifications. Index sheet in front of completed binder listing each piece of equipment or material submitted.
 6. Product Data to be utilized shall be flagged and noted and all other data shall be crossed out or otherwise flagged that it is not in the project.
 7. Data shall be inserted in binders in order of Specification number. Specification number shall be clearly labeled on each submittal page.
- D. As-built Drawings: As-built drawings shall be required from all Mechanical Subcontractors and shall accurately show all changes from Contract Documents for existing (work area only) and new piping, ductwork, and equipment.
- E. Operating and Maintenance Data: See Division 1 for the number of sets of data to be provided for submittal and additional requirements. Provide a minimum of four (4) copies. The following data shall be provided to the OWNER for approval 30 days prior to the request for Substantial Completion inspection. Except for the valve directory and nameplate directory, the data shall be provided complete at one time. Partial or separate data will be returned for completion. The valve directory and nameplate directory may be provided for approval previous to the other data. The first section of the O&M manual shall be as listed in the following subparagraphs in order presented hereunder. All of the following subparagraphs sections shall be furnished with permanent plastic see through covers. See requirements under 1.4.C for additional submittal and formatting requirements.
1. Cover and Index sheets as in 1.4.C. above.
 2. Description of systems and operating instructions: The Contractor shall prepare a brief type written description of all new and modified systems, explaining how the systems operate and indicating the proper settings of controls and switches. The instructions are to include all information required for the proper settings of controls and switches. The instructions are to include all information required for the proper operation of the systems. Technical knowledge on controls or adjustments requiring specialized technicians should not be included in the instructions.
 3. Nameplate directory: List of all new boilers, expansion tanks, thermostatic mixing valves, pumps, and other equipment nameplates, giving manufacturer's nameplate data, nameplate designation, location of equipment, area served, switch location, and normal position of the switch. Motor data must include the horsepower, voltage, full load amperage, phase, etc. See Section 15075 – Mechanical Identification.
 4. Manufacturers' literature: Manufacturers' instructions for operation and maintenance of all mechanical equipment and specialties, including replacement parts lists, capacity curves or charts, equipment data sheets, manufacturers' literature on the equipment, and as-built wiring diagrams and control drawings, all suitable for side binding to 8-1/2 x 11 inch size. All data not applicable to the job is to be crossed out or deleted. Manuals turned in for review with non-applicable data not crossed out shall be returned to the Contractor.

5. Maintenance instructions: Typewritten instructions for the maintenance of the systems, listing each service required on all of the mechanical equipment, including inspections, lubrication, cleaning, checking, and all other operations required. The list is to include all types of bearings installed on the equipment and the type of lubricant required.
 6. Maintenance schedule: List of each item of mechanical equipment requiring inspection, lubrication, cleaning, or service including the type of bearings and type of lubricating means for each piece of equipment. Each item of equipment is to be listed separately with the service required. List to include the times during the year when such inspection and maintenance shall be performed. The specific maintenance required shall be referenced back to the maintenance instructions.
 7. Valve directory: Indicating valve number, size, location, function, and normal position for each numbered valve. The directory shall be provided and approved before installation of the valve tags. A sample arrangement will be furnished upon request. Two copies required for the preliminary list. See Section 15075 – Mechanical Identification.
- F. Guide Documents: Sample operating and maintenance instructions and maintenance schedule may be obtained from the OWNER upon request, to assist in properly setting up the data.
- G. Instructions To Personnel and Training: The mechanical Subcontractor shall instruct operating personnel in the operation and maintenance of the systems before accepting the responsibility of operation and maintenance of the systems. Each training session shall be signed off by Project Manager.
- H. Submit prior to Substantial Completion Inspection and Final Inspection a detailed list of equipment and systems that will not be completed for the completion date. Include status and information of deficiencies from all previous inspection reports.
- I. Submit prior to Re-inspections of Substantial Completion Inspections, if applicable, and the Final Inspection a marked copy of the previous Engineers Inspection Reports detailing all items that have been completed and all items that have not been completed with reasons thereof. Re-inspection or Final Inspection will not occur until receipt of this list.
- 1.5 COOPERATIVE WORK
- A. The Work hereunder shall be coordinated between various mechanical Sections and with the Work specified under other divisions or contracts toward rapid completion of the entire Project. If any cooperative Work must be altered due to lack of proper supervision hereunder, or failure to make proper provisions in time, then the Work hereunder shall include all expense of such changes as are necessary to be made in the Work under other divisions and contracts, and such changes shall be directly supervised by the OWNER and shall be made to the satisfaction of the OWNER.
 - B. In general pitched piping and ductwork shall take preference in location within the Project area. Coordination of all drain valves, duct access doors, and other equipment requiring access and maintenance procedures is required with all building components during construction for maximum accessibility and proper location as intended. In many portions of the building, piping mains, piping branches, and sprinkler piping, as well as some duct branches will need to be installed in the joist space to allow for installation of duct mains. Coordinate closely with all other Contractors.

1.6 QUALITY ASSURANCE

- A. Perform Work in conformance with all applicable codes, regulations, local ordinances, contract documents, and generally accepted good practice. If discrepancies exist between Specifications and Contract Drawings then the solution that provides the Owner with the highest quality of product or installation shall be deemed as intended by the Contract Documents.

1.7 FIELD MEASUREMENTS

- A. See Division 1 for specific requirements regarding: Field Measurements and Site Conditions.
- B. Verifications: All measurements shall be verified at the site and prior to fabrications of equipment and systems. The existing conditions shall be fully observed before beginning the Work hereunder, and the Work hereunder executed in full coordination with the existing conditions observed. All hazardous material including asbestos materials that are discovered during the course of construction shall be immediately brought to the attention of the OWNER for action. All Work performed with hazardous materials not approved by the Owner shall be at the full responsibility of the contractor and not the Owner.
- C. Changes: Variations apparently necessary due to existing conditions shall be made only on approval in writing by the OWNER.

1.8 WARRANTY

- A. See Division 1 for specific requirements regarding: Product warranties and product Bonds.
- B. The contractor shall provide continuous and generally trouble-free operation of the mechanical systems for the time period listed in Division 1 or for one year after Substantial Completion whichever time period is longer. The operation and maintenance of systems other than incidental operations such as room thermostat settings or changing of air filters, shall be the sole responsibility of the contractor and shall be addressed by the contractor immediately if deficiencies are present. Leaking of valves, flanges, or air vents shall be addressed immediately by the contractor during the warranty period. Control settings, noise problems, and other deficiencies resulting in unsatisfactory environmental conditions shall be addressed immediately.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 15010

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pipe and equipment supports, hangers, sleeves, anchors, bases, and the sealing of Work to adjacent construction.

1.2 REFERENCES

- A. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- B. MSS SP69 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Selection and Application.
- C. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit manufacturers catalog data including load capacity. Provide specific UL listed manufacturer's data and shop drawing for piping and sleeves where required through fire rated assemblies.

1.4 QUALIFICATIONS

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

1.5 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:

1. Grinnel ITT.
2. Fee & Mason
3. Michigan Hanger Co.
4. PHD Manufacturing
5. Superstrut

B. General:

1. Hangers for Uninsulated Pipe Sizes 1/2 to 2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring or ring type.
2. Hangers for Uninsulated Pipe Sizes 2-1/2 inches and Over: Carbon steel, adjustable, standard clevis. Lightweight clevis type not acceptable
3. Hangers for Insulated Pipes with overall diameter (including insulation thickness) less than 4 inches: Malleable iron or Carbon steel, adjustable swivel, split ring or ring type. Hanger size includes pipe diameter and insulation thickness.
4. Hangers for Insulated Pipes with overall diameter equal to or larger than 4 inches (including insulation thickness): Carbon steel, adjustable swivel, standard clevis type. Lightweight clevis not acceptable. Hanger size includes pipe diameter and insulation thickness.
5. Copper Pipe Hanger: Plastic coated, carbon-steel adjustable, ring. For use where hanger materials in contact with dissimilar metal piping.
6. Beam and Joist Supports: Malleable iron C-clamp with locknut and galvanized steel retainer strap.
7. Wall Support for Pipe Sizes to 3 inches: Cast iron hooks.
8. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
9. Vertical Support: Steel riser clamp.
10. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
11. All Plumbing and Heating Piping Hangers shall conform to MSS SP58, MSS SP69.

2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, cadmium or zinc plated, threaded on one end, or continuous threaded.**

2.3 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Beams, Floors, Concrete Walls, and Footings: Schedule 40 galvanized steel pipe or 18 gage thick galvanized steel.**

- B. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Schedule 40 galvanized steel pipe. Seal space between sleeve and wall or floor with fire rated caulk. Install fire stopping insulation between sleeve and pipe. Seal opening with fire rated caulk. Seal per UL listing of fire rated caulk for specific wall type.
- C. Sleeves for Rectangular Ductwork: Galvanized steel.
- D. Stuffing Fire-stopping Insulation: Glass fiber type, non-combustible.
- E. Sealant: Intumescent Fire Rated Caulk. UL listed.

PART 3 - EXECUTION

3.1 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. Support horizontal cast iron pipe adjacent to each hub or joint, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide plastic coated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.
- 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. Provide hangers suitable for pipe size and insulation. Coordinate with Section 15080 for insulation thickness.
- M. Provide insulation shields between pipe insulation and hanger.
- N. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 15080.
- O. Provide neat and close fitting escutcheon at all exposed penetrations.

3.2 DUCT HANGERS AND SUPPORTS

- A. Support ducts as scheduled and required.
- B. Coordinate support connections with structural components and locations.
- C. Ducts secured against vibration and displacement.

3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members or Steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.4 SCHEDULES:

<u>PIPE SIZE</u> Inches	<u>MAX. HANGER SPACING</u> Feet	<u>HANGAR ROD DIAMETER</u> 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 15060

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes nameplates, tags, and pipe markers. Symbols, numbers, and all mechanical identification shall be in accordance with Contract Documents. All existing and new mechanical equipment in the Project area is to be identified.

1.2 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Provide manufacturers catalog literature for each product required.
- C. Shop Drawings: Provide list of wording, symbols, letter size, and color coding for mechanical identification and a valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number. Symbols, numbers, and all mechanical identification shall be in accordance with Contract Documents.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.
- B. Provide valve tag list for new valves.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing WORK of this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Manufacturers:

1. MSI Marking Services, Inc.
2. Safety Sign Co.
3. Seton Identification Products.

B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inches diameter with smooth edges.

B. Valve Tag Lists: Typewritten letter size list of applied tags and location in anodized aluminum frame under safety glass. Locate valve tag list in boiler room along with revised existing valve tag list. Cross out valves on existing valve tag list which have been removed in this project. Submit list of new valve tag list and revised valve tag list for approval prior to mounting. Copy of approved valve tag lists shall be located in O&M manual.

2.3 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Plastic Pipe Markers:

1. Manufacturers:

- a. MSI Marking Services, Inc.
- b. Safety Sign Co.
- c. Seton Identification Products.

2. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

3. To be used for un-insulated piping only.

C. Plastic Tape Pipe Markers:

1. Manufacturers:

- a. MSI Marking Services, Inc.
- b. Safety Sign Co.
- c. Seton Identification Products.

2. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 LABELS

A. Manufacturers:

1. MSI Marking Services, Inc.
2. Safety Sign Co.
3. Seton Identification Products.

- B. Description: Laminated Mylar, approximate size 1.9 x 0.75 inches, adhesive backed with printed identification.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of coverings and painting. Symbols, numbers, and all mechanical identification shall be in accordance with Contract Documents.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install labels and nameplates with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Install approved valve tag lists in Boiler Room and in Operating and Maintenance Manuals with a separate copy submitted to ENGINEER.
- F. Identify pumps, water heaters, expansion tanks, thermostatic mixing valves, boilers, burners, etc. with plastic nameplates.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with sequentially numbered tags.
- I. Identify heating unit valves including automatic valves with sequentially numbered tags.
- J. Label automatic controls, instruments, and relays. Key to control schematic.

- K. Identify new exposed piping and concealed piping that is accessible with plastic pipe markers or plastic tape pipe markers. Plastic pipe markers are to be used on uninsulated piping. Identify service and flow direction. 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. Inaccessible piping need not be identified if piping is identified at nearest accessible or exposed locations.

END OF SECTION 15075

SECTION 15080 – MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes ductwork insulation, equipment insulation, thermal insulation for piping systems including vapor retarders, jackets, and accessories. All new piping, equipment, and ductwork are to be insulated as specified. All existing piping, equipment, and ductwork are to be re-insulated where new work or connections are being performed. Re-insulate or repair insulation where previous insulation has been damaged due to new work or relocation of ductwork, piping, or equipment.
- B. Related Sections:
 - 1. Section 15075 – Mechanical Identification: Product requirements for mechanical identification for placement by this Section.

1.2 REFERENCES

- A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
- B. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
- C. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- D. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
- E. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- F. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).
- G. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- H. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
- I. ASTM C1136 – Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- J. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

- L. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- M. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
- N. NAIMA (North American Insulation Manufacturers Association) - National Insulation Standards.
- O. SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) - HVAC Duct Construction Standards - Metal and Flexible.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Provide product description, thermal characteristics and list of materials and thickness for each service, and locations.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing WORK of this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation outside ambient conditions required by manufacturer of each product.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MAN MADE MINERAL FIBER

A. Manufacturers:

1. Knauf.
2. Owens Corning.
3. CertainTeed.

B. Insulation: ASTM C547 Mineral Fiber Pipe Insulation, Type I 850 3 lb. density.

C. Vapor Retarder Jacket:

1. White Kraft paper with glass fiber yarn, bonded to aluminized film.
2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.

D. Tie Wire: 0.048-inch stainless steel with twisted ends on maximum 12-inch centers.

E. Vapor Retarder Lap Adhesive:

1. Manufacturers:
 - a. DuroDyne
 - b. Knauf
 - c. Vimasco
2. Compatible with insulation.

F. Insulating Cement/Mastic:

1. Manufacturers:
 - a. Vimasco
 - b. Fibrex
 - c. Insulco
 - d. DuroDyne
 - e. Childers
 - f. Fosters
2. Water based insulation adhesive, UL classified.

2.2 MINERAL FIBER, FLEXIBLE BLANKET OR BATTS

A. Manufacturers:

1. Owens Corning
2. Knauf
3. CertainTeed

- B. Insulation: ASTM C553; Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications. Type I, 850 1 lb. density.
 - C. Vapor Retarder Jacket: ASTM 1136, Type II Flexible and Low Permeance Vapor Retarders for Thermal Insulation.
 - 1. For systems operating at temperatures below ambient, close and secure seams and joints. If outward clinching staples are used, then the staple penetrations must also be sealed.
 - D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
 - E. Vapor Retarder Lap Adhesive:
 - 1. Manufacturers:
 - a. DuroDyne.
 - b. Knauf.
 - c. Vimasco.
 - 2. Compatible with insulation.
 - F. Insulating Cement/Mastic:
 - 1. Manufacturers:
 - a. Vimasco.
 - b. Fibrex.
 - c. Insulco.
 - d. DuroDyne.
 - e. Childers
 - f. Fosters
 - 2. Water based insulation adhesive, UL classified.
- 2.3 PVC Plastic.
- A. Manufacturers:
 - 1. Proto/Knauf.
 - 2. Owens Corning.
 - 3. Speedline.
 - B. Pipe Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - 1. Thickness: Minimum 15 mil
 - 2. Connections: Tacks or Pressure sensitive color matching vinyl tape.
 - C. Covering Adhesive Mastic:
 - 1. Manufacturers:
 - a. Proto/Knauf.
 - b. Owens Corning.

2. Compatible with insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install in accordance with NAIMA National Insulation Standards.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulate entire piping system including, but not limited to, fittings, valves, unions, flanges, strainers, and coil headers, unless otherwise noted.
- D. Insulated pipes conveying fluids below ambient temperature:
 1. Provide factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal all staple penetrations with vapor retarder mastic.
 2. Insulate fittings, flanges, unions, strainers, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with removable glass cloth and vapor retarder adhesive or PVC fitting covers. Removable section to be three inches either side of equipment.
- E. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- F. Insulated pipes conveying fluids above ambient temperature:
 1. Provide factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or the pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
 2. Insulate all fittings.
 3. Do not insulate flanges, unions, strainers, and valves serving piping 2-inches and under unless otherwise noted.
 4. Insulate valves, flanges, unions, and strainers serving piping 2-1/2 inches and larger with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers. Removable section to be three inches either side of equipment.
- G. Shields:
 1. Application: Piping or Equipment 1-1/2" insulated diameter or larger.

2. Shields: Galvanized steel between pipe hangers and insulation.
- H. Continue insulation through penetrations of building assemblies or portions of assemblies having a fire resistance rating of one hour or less.
- I. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- J. Fill joints, cracks, seams, and depressions with cement to form smooth surface.
- K. Finish insulation at supports, protrusions, and interruptions.
- L. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- M. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.
- N. Removable Equipment Covering: Booster coils. Removable Fiberglass Blanket with canvass type jacket and wire fasteners and hooks.
- O. Factory Insulated Equipment: Do not insulate.
- P. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- Q. Insulated ductwork conveying air below ambient temperature:
 1. Provide insulation with vapor retarder jackets.
 2. Finish with tape and vapor retarder jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- R. Insulated ductwork conveying air above ambient temperature:
 1. Provide with standard vapor retarder jacket.
 2. Insulate entire duct system including all appurtenances

3.3 SCHEDULES

- A. Piping Systems:
 1. Domestic Hot and Cold Water Supply: Mineral fiber pipe insulation, 1 inch thick.
 2. Heating Water Supply and Return: Mineral fiber pipe insulation:
 - a. Pipe Size Range: Up to and including 3" pipe diameter; thickness of 1-1/2 inch.
 3. Existing piping: Re-insulate or repair existing pipe insulation where piping connections are made. Mineral Fiber Pipe Insulation.

END OF SECTION 15080

SECTION 15110 - VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes valves not specified elsewhere.

1.2 REFERENCES

- A. ASME B16.3 (American Society of Mechanical Engineers) - Malleable Iron Threaded Fittings.
- B. AWS (American Welding Society) - Welding and Brazing Qualifications.
- C. MSS SP-67 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Butterfly Valves.
- D. MSS SP-71 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- E. MSS SP-80 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Bronze Gate, Globe, Angle and Check Valves.
- F. Section 15075: Mechanical Identification. For WORK hereunder.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit Manufacturers catalog information with valve data and ratings for each service.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves. Neatly record actual location of valves and valve tag numbers on piping plans and piping diagrams. Submit as part of record As-built set.
- B. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. Manufacturers:
 - 1. Nibco.
 - 2. Milwaukee.
 - 3. Powell.
 - 4. Hammond.
- B. Up To and Including 2 inches: MSS SP-80, Class 125, bronze body, bronze trim, hand-wheel, inside screw, solid wedge disc, threaded ends. 1" diameter and smaller valves may have soldered ends.

2.2 GLOBE VALVES

- A. Manufacturers:
 - 1. Nibco.
 - 2. Milwaukee.
 - 3. Powell.
- B. Up To and Including 2 inches: MSS SP-80, Class 125, bronze body, bronze trim, hand-wheel, bronze disc, threaded ends. 1" diameter and smaller valves may have soldered ends.

2.3 BALL VALVES

- A. Manufacturers:
 - 1. Nibco.
 - 2. Stockham.
 - 3. Hammond.

- B. Construction, 3 inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends. 1" diameter and smaller valves may have soldered ends.

2.4 SWING CHECK VALVES

- A. Up To and Including 2 inches:

- 1. Manufacturers:

- a. Nibco.
- b. Milwaukee.
- c. Hammond.

- 2. MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, threaded ends. 1" diameter and smaller valves may have soldered ends.

2.5 SPRING LOADED CHECK VALVES

- A. Up To and Including 2 inches:

- 1. Manufacturers:

- a. Nibco.
- b. Milwaukee.
- c. Hammond.

- 2. Class 125, bronze body. Stainless steel stem and 316 Stainless steel spring with rubber seat, threaded ends. 1" diameter and smaller valves may have soldered ends.

2.6 RELIEF VALVES

- A. Temperature and Pressure Relief:

- 1. Manufacturers:

- a. Watts.

- 2. Construction: AGA Z21.22 certified, bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME SEC IV certified and labeled. Size per ASME requirements.

2.7 FLANGES, UNIONS, 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. Gaskets: 1/16-inch thick preformed neoprene.
- C. Accessories: Steel bolts, nuts, and washers.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify Piping System is ready for installation.

3.2 INSTALLATION

- A. Install valves with stems upright or above horizontal, not inverted.
- B. Valves shall be same size as connected piping unless shown otherwise.
- C. Install ball valves for 3-inch pipe size and under for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe or ball valves for throttling, bypass, or manual flow control services.
- E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- F. Install unions downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- G. Provide spring loaded check valves on discharge of water pumps. Install minimum 4 pipe diameters downstream from pump discharge or elbows.
- H. All swing check valves installed in horizontal position.
- I. Provide flow controls in water re-circulating systems where indicated.
- J. Use 3/4-inch gate valves with cap and hose end adaptor for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Install vacuum breaker on all drain valves on domestic water systems.

END OF SECTION 15110

SECTION 15120 - PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pressure gages and pressure gage taps, thermometers and thermometer wells, expansion tanks, air separators, air vents, strainers, access doors, flowsetters, water feeders, and relief valves.
- B. Related Sections:
 - 1. Section 15180 – Heating Piping: Execution requirements for piping connections to products specified by this Section.
 - 2. Section 15140 – Domestic Water Piping: Execution requirements for piping connections to products specified by this Section.

1.2 REFERENCES

- A. ASME (American Society of Mechanical Engineers) - Boiler and Pressure Vessel Codes, SEC VIII-D - Rules for Construction of Pressure Vessels.
- B. ASTM E1 - Standard Specification for ASTM Thermometers.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit for manufactured products and assemblies required for this Project.
 - 1. Manufacturer's data indicating use, operating range, total range, accuracy, and location for manufactured components.
 - 2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
 - 4. Submit schedule of pressure gage and thermometers detailing service and scale.
- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components, instrumentation and flowsetters.
- B. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing WORK of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Particular care shall be taken in storage and handling of such materials to maintain its clean condition. Provide temporary end caps and closures on piping and fittings until ready for immediate use. Maintain in place until installation. Store piping, materials, and equipment in clean, enclosed from weather, location at all times. Piping is not to be stored in direct contact with dirty surfaces or on dirt floor. If piping, equipment, and components are found to be improperly stored they shall be removed from the project immediately and new materials shall be used.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install instruments when areas are under construction, except for required rough in, taps, supports and test plugs.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 EXTRA MATERIALS

- A. Supply two complete spare automatic and manual air vents and one package of air vent o-rings, minimum six per package.
- B. Supply one spare pressure gage.

- C. Supply one spare thermometer.

PART 2 - PRODUCTS

2.1 PRESSURE GAGES

- A. Manufacturers:

- 1. Terrice.
- 2. Weiss.
- 3. Weksler.
- 4. Ashcroft.

- B. Gage: UL listed with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.

- 1. Case: Steel, cast aluminum, or fiberglass-reinforced polypropylene.
- 2. Bourdon Tube: Brass or stainless steel.
- 3. Dial Size: 4 inch or 4-1/2 inch diameter.
- 4. Mid-Scale Accuracy: One percent.
- 5. Scale: Psi.

2.2 THERMOMETERS, DIGITAL TYPE

- A. Manufacturers:

- 1. Weiss.

- B. Thermometer: Adjustable angle, digital solar powered thermometer, with positive locking device.

- 1. Stem: Brass, 3/4 inch NPT, 3-1/2 inch long.
- 2. Accuracy: 2 percent.
- 3. Calibration: Both degrees F and degrees C.

2.3 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required

2.4 TEST PLUGS

- A. Manufacturers:

- 1. Pete's Plug.
- 2. Sisco.
- 3. Universal Lancaster.

- B. 1/4 inch NPT or 1/2 inch NPT brass self sealing fitting and screw type sealing cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.

2.5 EXPANSION TANKS (ET)

- A. Manufacturers:
 - 1. Amtrol.
 - 2. Taco.
- B. ET-1 (Heating Water): Replaceable Bladder type: Welded steel, tested and stamped in accordance with ASME SEC 8-D; rated for working pressure of 125 psig, with replaceable bladder.
- C. ET-2 (Domestic water): Diaphragm type: Welded steel, tested and stamped in accordance with ASME SEC 8-D; rated for working pressure of 100 psig, with flexible butyl diaphragm sealed into tank. Potable domestic water use. Pre-pressurized at 40 psi.
- D. Accessories: Pressure gage and air-charging fitting.
- E. Size: See Schedules.

2.6 WATER FEEDER

- A. Manufacturers:
 - 1. Bell & Gossett
 - 2. Watts, Model U5LP.
- B. Construction: Cast brass or bronze body, adjustable, low inlet pressure check valve or spring assembly and built-in removable strainer, threaded connections, suitable for feedwater control of heating water systems. Seat, stem, and strainer brass or stainless steel construction.
- C. Capacity: 1/2-inch size. Set for 15 psig no flow pressure.

2.7 AUTOMATIC AIR VENT

- A. Manufacturers:
 - 1. Hoffman, Model 79.
 - 2. Honeywell Braukman, Model EA-79.
 - 3. Spirotherm, Spirotop.
- B. Automatic Air Vent; Float Type:
 - 1. Brass body, solid non-metallic float, vented top threaded for connection of drain. Automatic air vent suitable for system operating temperature and pressure; with isolating valve.

2.8 MANUAL AIR VENT

A. Manufacturers:

1. Hoffman Model 500.
2. Bell & Gossett Model 17SR.
3. Taco Model 417.
4. Substitutions: Not Permitted.

- B. Manual Air Vent; Washer Type: Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.9 AIR SEPARATORS (AS-1)

A. Manufacturers:

1. TACO
2. AMTROL
3. Spirovent

B. Air Separators, Inline type:

1. One piece cast-iron type with engineered baffle to separate air and water. Threaded blowdown connection port at bottom and threaded connection on top for air vent.
2. High capacity air vent.

2.10 STRAINERS

A. Manufacturers:

1. Hoffman.
2. Spiray/Sarco
3. Mueller.

- B. Size 2 inch and Under: Screwed brass body for 125 psig working pressure, Y pattern with 1/32 inch removable stainless steel perforated screen.

2.11 FLOWSETTERS

A. Manufacturers:

1. Bell & Gossett Circuit Setter.
2. Armstrong CBV.
3. Taco Accuflo.

- B. Angle or straight pattern, inside screw globe or ball valve for 125 psig working pressure, with bronze body and integral union for screwed connections, renewable composition disc, plastic wheel handle for shut-off service, and lock-shield key cap and set screw memory bonnet for balancing service. 1/2 inch or 3/4 inch may be sweat type. Valve bodies to have differential read-out ports and caps. Provide three probe adapters for meter reading. Provide two spare read-out port caps.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gage taps in piping where gages are required.
- B. Install pressure gages with 1/4-inch needle valve or ball valve to isolate each gage except for boiler water gage. Extend nipples to allow clearance from insulation.
- C. Provide heating system pressure-reducing stations with pressure reducing valve, bypass with valve, strainer and pressure gage on upstream side, relief valve and pressure gage on downstream side of pressure reducing valve.
- D. Install thermometers in piping systems in sockets in short couplings. Ensure sockets allow clearance from insulation.
- E. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets.
- F. Coil and conceal excess capillary on remote element instruments.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale. Normal measurement point to be mid scale.
- H. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- I. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- J. Locate test plugs where indicated.
- K. Provide air separator on suction side of main heating pumps.

- L. At automatic air vents, provide enlarged air collection standpipes and install drainage tubing to nearest drain as detailed or shown.
- M. Provide drain and hose connection with valve on strainer blowdown connection.
- N. Pipe relief valve outlet to floor sink.
- O. Where piping penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent WORK with stuffing or fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- P. Install chrome plated steel escutcheons at all finished surfaces.

3.2 CLEANING

- A. Clean all strainers immediately after pump start-up. Verify with Maintenance after complete.

3.3 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not install hydronic pressure gauges until after systems are pressure tested.

END OF SECTION 15120

SECTION 15130 - PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pumps.
- B. Related Sections:
 - 1. Section 15180 – Heating Piping: Execution requirements for connection to pumps specified by this Section.
 - 2. Division 16 – Electrical: Product and Execution Requirements that apply to this section.

1.2 REFERENCES

- A. UL 778 (Underwriters Laboratories, Inc.) - Motor Operated Water Pumps.
- B. NEMA – National Electrical Manufacturers Association.

1.3 PERFORMANCE REQUIREMENTS

- A. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading at any point on the pump curve in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Pumps used for domestic water service shall be of all bronze construction.

1.4 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include efficiencies, specific NPSH curve and impeller size when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes, and finishes.
- C. Manufacturer's Installation Instructions: Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing WORK of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 EXTRA MATERIALS

- A. Supply one complete spare pump for P-1, P-2, P-3, and P-5.

PART 2 - PRODUCTS

2.1 SYSTEM LUBRICATED CIRCULATORS

- A. Manufacturers:
 - 1. Taco 00 Series.
 - 2. Armstrong, Series SS.
 - 3. Bell & Gossett, Booster Series.
 - 4. Grundfos.
- B. Type: Horizontal shaft, single stage, direct connected with wet rotor motor for in-line mounting, for 140-psig maximum working pressure, 230 degrees F maximum water temperature. All bronze for domestic hot water recirculation.
- C. Casing: Bronze with flanged pump connections.

- D. Shaft, Rotor: Ceramic.
- E. Bearings: Metal Impregnated carbon (graphite) and ceramic.
- F. Motor: Impedance protected, non-overloading at any point on the pump curve.
- G. Performance: See Schedules.
- H. Variable Speed: Provide variable speed pump for P-5.
- I. Electrical Characteristics:
 - 1. See Schedules on drawings.
 - 2. Motor: 3250 rpm.
 - 3. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Motors: Ensure proper alignment and rotation.
- B. Verify existing power requirements on-site.

3.2 COORDINATION

- A. Coordinate this work with the work of other trades, and make arrangements for the complete and proper accomplishment of all related work. Coordinate required control interlocks with automatic controls contractor.

END OF SECTION 15130

SECTION 15140 – DOMESTIC WATER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes domestic water piping, fittings, and accessories.
- B. Related Sections:
- C. Drawings and general provisions of the Contract, including General, Supplementary Conditions, and all Division Specification Sections, apply to this Section.
 - 1. Section 15060 – Hangers and Supports: Product and Execution requirements for piping installation in equipment specified by this Section.
 - 2. Section 15075 – Mechanical Identification: Product requirements for pipe identification and valve tags for placement by this Section.
 - 3. Section 15080 – Mechanical Insulation: Product and Execution requirements for insulation installation on piping and equipment specified by this Section.

1.2 REFERENCES

- A. ASME B16.22 (American Society of Mechanical Engineers) - Wrought Copper and Bronze Solder Joint Pressure Fittings.
- B. ASME B16.26 (American Society of Mechanical Engineers) - Cast Bronze Fittings for Flared Copper Tubes.
- C. ASME B31.9 (American Society of Mechanical Engineers) - Building Service Piping.
- D. ASTM B32 - Solder Metal.
- E. ASTM B42 - Seamless Copper Pipe.
- F. ASTM B88 - Seamless Copper Water Tube.
- G. ASSE 1011 (American Society of Sanitary Engineering) - Hose Connection Vacuum Breakers.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit manufacturer data on all materials specified.

- C. Manufacturer's Installation Instructions: Submit installation instructions for equipment and accessories. Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping and equipment.
- B. Operation and Maintenance Data: Submit spare parts lists, exploded assembly views and recommended maintenance intervals for equipment.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept equipment on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- D. Particular care shall be taken in storage and handling of such materials to maintain its clean condition. Provide temporary end caps and closures on piping and fittings until ready for immediate use. Maintain in place until installation. Store piping in clean, enclosed from weather, location at all times. Piping is not to be stored in direct contact with dirty surfaces or on dirt floor. If piping and components are found to be improperly stored they shall be removed from the project immediately and new materials shall be used.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA. Mechanical press fit joint with gasket equivalent to PROGRESS acceptable.

2.2 FLANGES AND UNIONS

- A. Pipe Size 3 inches and Under:
 - 1. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Pipe Size Over 3 inch:
 - 1. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 FIRE STOP SYSTEMS

- A. Manufacturers
 - 1. Hilti
 - 2. Dow Corning
 - 3. Fyre Putty
- B. General purpose Vibration Resistant Fire Stopping Sealant: Silicone based, non-slumping premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.
- C. Fire rated Stuffing: Non-combustible mineral wool insulation.

2.4 TEMPERING VALVES (TV-1)

- A. Manufacturers:
 - 1. POWERS MM430.
 - 2. Leonard TM.
 - 3. Honeywell

- B. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment. Pressure balancing and temperature limiting. ½-inch inlets, 3/4-inch outlet. Bypass for recirculating system.
 - C. Capacity: See Schedule for specific models.
 - 1. TV-1: Building Hot Water (Boiler Room): 2 GPM maximum at 10psi. Set at 115F. Hot Water: Minimum flow of 2 gpm and maximum flow of 10 gpm at 7 psi differential. Temperature range: 85F to 160F. Set at 115F.
 - D. Accessories:
 - 1. Check valve on inlets.
 - 2. Volume control shut-off valve on outlet.
 - 3. Stem thermometer on outlet.
 - 4. Strainer stop checks on inlets.
- 2.5 EXPANSION TANK ET-2
- A. Manufacturers:
 - 1. Amtrol Therm-X-Trol
 - 2. Taco.
 - B. Construction: Welded steel, pre pressurized butyl diaphragm thermal expansion chamber. Adjustable, factory charged to 40 psi, sealed air cushion. FDA approved for domestic water hot water use. ASME rated. Minimum total volume of 4.4 gallons.
- 2.6 BACKFLOW PREVENTERS (REDUCED PRESSURE TYPE)
- A. Manufacturers:
 - 1. Conbraco Industries.
 - 2. Watts Regulator Company.
 - 3. Zurn Industries, Inc.
 - B. Reduced Pressure Backflow Preventers:
 - 1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks. Suitable for 150 psi working pressure. Unions on inlet and outlet. Funnel drain with air gap installed under relief vent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavate

3.2 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.

3.3 INSTALLATION

- A. Coordinate piping locations closely with other trades.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom and neither interfere with use of space nor take more space than necessary.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15060 - Hangers and Supports and 15080 – Mechanical Insulation.
- H. Provide access where valves and fittings are not accessible.
- I. Install valves with stems upright or horizontal, not inverted.
- J. Sleeve pipes passing through partitions, walls and floors as required by Section 15060 - Hangers and Supports.
- K. Seal penetrations as required by Section 15060 - Hangers and Supports.
- L. Install vacuum breaker and cap on all drain valves.
- M. Pipe relief from valves, back-flow preventers and drains to nearest floor drain. Pipe relief valve outlets separately to nearest drain.

- N. Provide chrome-plated escutcheons at all exposed piping penetrations through walls, floors, ceilings, partitions, and structural components.
 - O. Piping Tests: All domestic water piping tested hydrostatically at 125 psi for a minimum of one hour. Equipment, gages, and thermometer wells rated for a lesser pressure suitably protected during tests. Leaks developed during tests shall be corrected without caulking in threaded piping or additives and test restarted until a perfectly tight system is obtained. Enclosed piping tested before concealing. Tests performed in presence of ARCHITECT.
 - P. Provide written verification of adjustment and settings of tempering valve.
- 3.4 INTERFACE WITH OTHER PRODUCTS
- A. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

END OF SECTION 15140

SECTION 15180 - HEATING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes systems, accessories, pipe and pipefittings for heating piping.
- B. Related Sections:
 - 1. Section 15060 – Hangers and Supports: Product requirements for piping hangers and supports for placement by this section.
 - 2. Section 15080 Mechanical Insulation: Product requirements for Piping Insulation for placement by this section.
 - 3. Section 15120 – Piping Specialties.

1.2 REFERENCES

- A. ASME (American Society of Mechanical Engineers) - Boiler and Pressure Vessel Codes, SEC IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. ASME B16.18 (American Society of Mechanical Engineers) – Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B16.22 (American Society of Mechanical Engineers) – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B31.9 (American Society of Mechanical Engineers) - Building Services Piping.
- E. ASME SEC VIII-D (American Society of Mechanical Engineers) - Boilers and Pressure Vessels Code, Rules for Construction of Pressure Vessels.
- F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- G. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- H. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- I. AWS A5.8 (American Welding Society) - Brazing Filler Metal.
- J. MSS SP58 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Materials, Design and Manufacture.
- K. MSS SP69 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Selection and Application.

- L. MSS SP89 (Manufacturers Standardization Society of the Valve and Fittings Industry) - Pipe Hangers and Supports - Fabrication and Installation Practices.
- M. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- N. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- O. ASTM B32 - Solder Metal.
- P. ASTM B88 - Seamless Copper Water Tube.
- Q. AWS D1.1 (American Welding Society) - Structural Welding Code.

1.3 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 unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Use ¾-inch gate valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

1.4 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product Data: Submit data on pipe materials, pipefittings, valves, insulation, equipment, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Manufacturer's Installation Instructions: Provide complete installation instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves, equipment and heating accessories.
- B. Operation and Maintenance Data: Submit instructions for installation and changing components, spare parts lists, exploded assembly views.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Fabricator or Installer: Company specializing in performing WORK of this section with minimum three years documented experience approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Particular care shall be taken in storage and handling of such materials to maintain its clean condition. Provide temporary end caps and closures on piping and fittings until ready for immediate use. Maintain in place until installation. Store piping in clean, enclosed from weather, location at all times. Piping is not to be stored in direct contact with dirty surfaces or on dirt floor. If piping and components are found to be improperly stored they shall be removed from the project immediately and new materials shall be used.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system Protect

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GROUND

- A. Copper Tubing: ASTM B88, Type L hard drawn. (Up to and Including 3-inches size)
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
 - 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. Mechanical press fit joint with gasket equivalent to PROGRESS acceptable.
- B. Steel Pipe: ASTM A53, Schedule 40, black.
 - 1. Fittings: ASTM B16.3, malleable iron or ASME A234, forged steel welding type.

2. Joints: Threaded for piping 2-inches and under. AWS D1.1, welded for pipe over 2-inches.

2.2 STRAINERS

A. Manufacturers:

1. Hoffman.
2. Spiray/Sarco
3. Mueller.

B. Size 2 inch and Under:

1. Screwed brass or iron body for 125 psig working pressure, Y pattern with 1/32 inch removable stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:

1. Flanged iron body for 125 psig working pressure, Y pattern with 3/64 inch removable stainless steel perforated screen.

2.3 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88, Type DWV hard drawn.

1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.4 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. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.5 FIRE STOP SYSTEMS

A. Manufacturers:

1. Hilti.
 2. Dow Corning.
 3. Fyre Putty.
- B. General Purpose Fire Stopping Sealant: Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- C. General Purpose Vibration Resistant Fire Stopping Sealant: Silicone based, non-slumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.
- D. Fire rated Stuffing: Non-combustible mineral wool insulation.

PART 3 - EXECUTION

3.1 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. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

- A. See plans for information on existing piping material. Install similar piping type as specified hereunder for each system. Install dielectric unions where required for connection to dissimilar materials.
- B. Route piping parallel to building structure and maintain gradient of 1/4 inch per ten feet of length. Arrange to drain at low points.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Coordinate piping locations with all trades.
- F. Sleeve pipe passing through partitions, walls and floors.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- H. Branch piping connected to sides of mains. Connections off of top or bottom not permitted. When approved by the Engineer, branch piping may be connected to side of mains at a 45-degree angle when limited by space.
- I. Sleeve pipes as required by Section 15060 – Hangers and Supports.
- J. Seal penetrations as required by Section 15060 – Hangers and Supports.
- K. Where piping penetrates 1-hour wall, run insulation through penetration. Seal penetration with fire stopping insulation and seal with fire stopping sealant. If sleeve is used as required in concrete penetrations, seal opening between pipe and sleeve with fire stopping insulation and seal with fire stopping sealant. Seal as required by manufacturers UL fire rated assembly listing.
- L. Provide chrome plated escutcheons at all exposed, uninsulated piping penetrations through walls, floors, ceilings, partitions, and structural components.
- M. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 15060 – Hangers and Supports and 15080 – Mechanical Insulation.
- N. Slope piping at 1/4" per 10' and arrange systems to drain at low points.
- O. Prepare uninsulated pipe, fittings and supports ready for finish painting. Refer to Division 9
- P. Piping Tests: All heating piping tested hydrostatically at 125 psi for a minimum of four hours. System shall remain tight for test period without leaks, displacement, or straining. Equipment, gages, and thermometer wells rated for a lesser pressure suitably protected during tests. Leaks developed during tests shall be corrected without caulking and test restarted until a perfectly tight system is obtained. Enclosed piping tested before concealing. Tests performed in presence of OWNER.
- Q. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.
- R. Install valves with stems upright or horizontal, not inverted.

END OF SECTION 15180

SECTION -

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes piping, underground fuel tank, fuel tank monitoring system, oil tank specialties, and appurtenances for the fuel oil piping system.
- B. Related Sections:
 - 1. Drawings and general provisions of the Contract, including General, Supplementary Conditions, and all Division Specification Sections, apply to this Section.
 - 2. Division 2: Excavation, Backfill & Compaction.

1.2 REFERENCES

- A. ASME B16.18 (American Society of Mechanical Engineers) - Cast Copper Alloy Solder-Joint Pressure Fittings.
- B. ASME B16.22 (American Society of Mechanical Engineers) - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- C. ASME B16.26 (American Society of Mechanical Engineers) - Cast Bronze Fittings for Flared Copper Tubes.
- D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- E. AWS A5.8 (American Welding Society) - Brazing Filler Metal.
- F. NFPA 30 (National Fire Protection Association) - Flammable and Combustible Liquids Code.
- G. NFPA 31 (National Fire Protection Association) - Installation of Oil Burning Equipment.
- H. UL 142 (Underwriters Laboratories, Inc.) - Steel Aboveground Tanks for Flammable and Combustible Liquids.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Shop Drawings: Indicate tanks, system layout, pipe sizes, location, tappings, controls and elevations. For fuel oil tanks, provide complete shop drawings and indicate dimensions and accessories including manholes, sumps, manway, and hold down straps. Manufacturer to provide wiring diagrams for specific project detailing all accessories.

SECTION -

- C. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information and warranty data. Indicate valve data and ratings.

1.4 CLOSEOUT SUBMITTALS

- A. See Division 1 for specific requirements regarding: Closeout procedures.
- B. Project Record Documents: Record actual locations of valves, piping system, storage tanks, and system components.
- C. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views, as-built drawing of fuel tank, sumps, and manholes. Provide complete operating instructions and completed warranty information.

1.5 START-UP

- A. Manufacturer's factory trained technician start-up of leak detection system required. Provide copy of start-up report to OWNER and in O&M manual.

1.6 TRAINING

- A. Provide a minimum of two hours training by factory certified and trained technician of the leak detection and monitoring/volume measuring system after system has been calibrated and demonstrated to be operating correctly.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 30 and NFPA 31.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. See Division 1 for specific requirements regarding: Product storage and handling requirements.

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- B. Accept valves on site in shipping containers with labeling in place. Inspect all equipment for damage.
- C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Provide temporary protective coating on cast iron and steel valves.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.12 WARRANTY

- A. See Division 1 for specific requirements regarding: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 DOUBLE CONTAINMENT FUEL OIL PIPING

- A. Description: UL listed double wall piping system for use with petroleum products installed in 4-inch or 6-inch containment piping.
- B. Double wall fuel piping: Multi-layer bonded construction. Outer stand-off jacket to create interstitial space for fluid migration, monitoring, and periodic pipe testing. Smooth inner bore. Similar to Environ GeoFlex D. To be installed in 4-inch or 6-inch containment enclosure.
- C. Containment Enclosure: Double wall piping installed in 4-inch or 6-inch flexible direct bury containment enclosures.
- D. Termination Fittings
 1. Steel Termination Assembly: Functions as a sleeve for the primary pipe and termination seal for secondary pipe. Secured to secondary pipe water tight. Suitable for flush installation in boiler rooms.
 2. Termination Plug: Steel plug sealed to end of termination assembly. Double NPT tapped ports for threading primary and rigid piping to plug.
 3. Provide flexible entry boot termination assemblies for connection to sump at oil tank.

SECTION -

2.2 FUEL OIL VENT PIPING UNDERGROUND

- A. Single wall. Multi-layer bonded construction. Smooth inner bore. Similar to Environ GeoVent.

2.3 ABOVEGROUND FUEL OIL PIPING AND ABOVEGROUND VENT PIPING

- A. Steel Pipe, ASTM A53 or ASME B36.10 Schedule 40 black.
 - 1. Fittings: ASTM B16.3, malleable iron, or ASTM A234/A234M wrought carbon steel and alloy steel welding type.
 - 2. Joints: NFPA 30, threaded.

2.4 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 inches and Under: Ferrous pipe: 150-psi malleable iron threaded unions.

2.5 PIPE HANGERS AND SUPPORTS

- A. Wall, Floor and Trench Support: Cast iron pipe clamp
- B. Floor Saddle: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and steel support.

2.6 BALL VALVES

- A. Manufacturers:
 - 1. Nibco.
 - 2. Stockham.
 - 3. Hammond.
- B. MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded ends. Listed for use with fuel oil.

2.7 CHECK VALVES

- A. Manufacturers:
 - 1. Firomatic.
 - 2. Nibco.
 - 3. Milwaukee.

SECTION -

- B. Up to 2 inches: MSS SP-80, Class 150, bronze body and cap, soft neoprene seat, threaded ends. Suitable for tight shutoff

2.8 FUSIBLE VALVES

- A. Manufacturers:

- 1. Fiomatic.

- B. Nonferrous body, with wheel handle and fusible element to close the valve automatically above 165F. Suitable for manual operation. UL Listed.

2.9 FUEL OIL SYSTEM SPECIALTIES

- A. Vent Cap: Screened air vent for downward venting, T design. Cast-iron construction with screened outlets. Similar to Emco A-0785, Clay & Bailey 300.
- B. Containment Fill Manhole: Watertight. For installation belowgrade and underneath surface manhole. Cast-iron body. Minimum 5 gallon capacity with integral pull type drain with a fluoroelastomer o-ring. Connected to 4" IPS tank fitting with nipple. Similar to OPW 101BG-2100C series.
- C. Manhole above Main Sump: Watertight. 36-inch Steel. Recessed T-handle for flush installation. Painted (1) coat rust preventive paint and (2) coats finish paint.
- D. Manhole above Containment Fill Manhole: 24-inch Steel. Recessed T-handle for flush installation. Painted (1) coat rust preventive paint and (2) coats finish paint.
- E. Monitoring Sump Manhole: Watertight. 24-inch Steel. Recessed T-handle for flush installation. Painted (1) coat rust preventive paint and (2) coats finish paint.
- F. Secondary Containment Couplings: Two and three piece threaded coupling kits for attachment of piping and electrical connections to bulkhead attached collar riser. Kit to include couplings, fiberglass reinforced plastic or steel, adhesive and instructions.
- G. Electrical Connections: Conduit and electrical junction boxes provided for tank level gage and for monitoring of leak detection. One 1-inch conduit installed between monitoring sump manhole and boiler room for monitoring of leak detection and fuel tank level.
- H. Drop Tube: Lightweight aluminum with Buna gasket. To fit directly into the tank fill connection and spill containment. Size, 4 inches. Bottom cut at 45 degrees, with center line of slope from 5 to 8 inches above the bottom of the tank.
- I. Overfill Prevention System: Positive shutoff at 95 percent of tank capacity. 4-inch. With dip stick diverter. Similar to Emco-Wheaton A1100.

SECTION -

- J. Fill and Gage Stick Cap: Locking type, water tight, threaded connection, brass or cast iron construction. brass, with cast-iron lid. Similar to Emco-Wheaton A-752 or Morrison MR-178.
- K. Gage Stick: Wooden rod approximately 12 feet long, with chain and 5-inch diameter ring attached to top end. Rod graduated in volume for tank furnished, indicated in gallons, with graduation not more than 1-1/2 inches on center. Numerals not less than 1/4 inch high. Supplier to write-in gallon levels if necessary.
- L. Fuel Meter: Analog high precision oscillating piston oil flow meter suitable for light heating oil. Brass body, brass working chamber, anodized aluminum piston, Viton o-rings, and stainless steel safety filter. Accuracy of 1% at flow range of 20 gallons per hour with #2 fuel at 70F. 1/8-inch size. Equal to AMCO Model 4.

2.10 UNDERGROUND FUEL STORAGE TANKS

- A. Tank Manufacturers:
 - 1. Busby Marine and Tank, Inc. - Permatank.
 - 2. Plasteel, Inc.
- B. Steel Double Wall Tank: UL 1746, UL listed and labeled. Double wall construction. Inner wall of heavy gage welded steel, minimum thickness of 10 gage. Outer wall of fiberglass coating, minimum of 100 mils thick. Provide anchor straps and attachments, fittings, lifting lugs, and taps for accessories as shown. Striker plates below fill opening. Protection system to conform to current State and Federal requirements for underground storage tanks. Similar to Permatank.
- C. Capacity:
 - 1. Volume: Nominal 1000 gallons.
 - 2. Diameter: 4 feet.
 - 3. Overall Length: 13 feet.
- D. Man-way: 24 inch diameter bolted manway with plated bolts, nuts, washers, UL listed gasket, and with minimum four 4 inch fittings and couplings in cover. Equipped with 3/8 inch N.P.T. plug to bleed manway during tank testing.
- E. Secondary Containment Attachments: 42 inch diameter fiberglass watertight access attached collar and riser for access to tank, with cover and gasket, and extension sleeve; located at top of tank. Waterproof lid. 30 year warranty on sump and lid. Include installation tool kits, penetrations, and bonding kits. Similar to Western Fiberglass, Inc. TAP42-6210-A.

2.11 VACUUM GAGES

- A. Manufacturers:

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1. Trerice.
2. Weiss.
3. Weksler.

B. Gage: UL listed with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.

1. Case: Steel, cast aluminum, or fiberglass reinforced polypropylene.
2. Bourdon Tube: Brass or stainless steel.
3. Dial Size: 4 inch or 4-1/2 inch diameter.
4. Mid-Scale Accuracy: One percent.
5. Scale: Compound 30"-0-30 In. Hg. Vacuum/PSI

2.12 LEAK MONITORING SYSTEM

A. Manufacturers:

1. Veeder-Root TLS-300i
2. No substitutions for standardization.

B. Description: UL listed. Capable of monitoring up to 4 underground tanks. With interstitial tank monitoring capability. LED display. Key pad communication. Communications interface with 4-20mA output signal for fuel level monitoring. Alarm functions. Integral printer. Responsibility for complete and operating system hereunder.

C. Interstitial Space Monitoring Sensor: Dual float sensor capable of monitoring interstitial space in double wall fuel tanks.

D. Fiberglass Sump Monitoring Sensor: Sensor to detect the presence of water and/or fuel in the sump. Sensor to be the discriminating type capable of sensing type of liquid (water or fuel).

E. Inventory Probe: Float type sensor for detecting fuel level for specific tank.

F. Accessories: Level probes, monitoring sensors, electrical connections, and complete installation, testing, and operating instructions provided with panel. Responsibility included hereunder for all work required to complete installation, including Electrical.

G. Remote Monitoring Capability: Provide contact for 4-20 mA output signal for remote fuel level monitoring in gallons.

H. Responsibility for complete and operating system, including wiring and installation of all probes, accessories, lights, buzzers, alarms, etc. not covered in ELECTRICAL WORK is included hereunder. Coordinate with Electrical.

I. Start-Up: Provide factory trained technician final calibration and start-up.

SECTION -

PART 3 - EXECUTION

3.1 EXAMINATION

- A. See Division 1 for specific requirements regarding: Coordination and project conditions.
- B. Verify fuel storage tank are undamaged.

3.2 PREPARATION

- A. 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. Install tank concrete ballast.

3.3 INSTALLATION

- A. General:
 - 1. Install in accordance with manufacturers recommendations and installation instructions for complete conformance with warranty requirements. Complete written verification of compliance and submit to tank manufacturer in accordance with warranty requirements. Submit duplicate to OWNER and in O&M manuals.
 - 2. Install in accordance with Alaska Department of Environmental Conservation and EPA standards and requirements.
 - 3. Install vacuum gages with 1/4 inch needle valve or ball valve.
 - 4. Provide instruments with scale ranges selected according to service with largest appropriate scale. Normal measurement point to be mid scale.
 - 5. Adjust gages to final angle, clean windows and lenses, and calibrate to zero.
 - 6. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
 - 7. Route piping in orderly manner and maintain gradient.
 - 8. Install piping to conserve building space and not interfere with use of space.
 - 9. Group piping whenever practical at common elevations.
 - 10. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 - 11. Sleeve pipes through concrete foundation walls.
 - 12. Provide access to valves and fittings.
 - 13. Install valves with stems upright or horizontal, not inverted.
 - 14. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
 - 15. Clean and flush underground tank after installation. Seal until pipe connections are made.

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16. Install underground tanks on concrete ballast as detailed and secure with hold-down straps and turnbuckles as shown.
17. Install underground tanks with minimum 36 inches of cover.
18. Backfill tanks and sumps with washed pea gravel to a minimum of 12 inches around. Do not bed on timbers, beams, or cradles.
19. All underground metal fittings and straps coated with coal tar epoxy paint or approved equal corrosion protection. All coatings are to be dry prior to backfill.
20. Bulkhead couplings attached to collars per instructions with adhesive required and provided in kit from manufacturer.
21. Special Inspection: Entire tank and backfill installation witnessed by OWNER'S Representative. Provide minimum 10 days advance notice of tank installation prior to special inspection. CONTRACTOR to take pictures of all steps of tank installation including excavation, ballast and tank placement, painting of exposed metal, backfill, etc. Provide pictures to OWNER and also include in O&M manual.
22. Provide concrete pad over tank with manholes flush with concrete surface. The concrete pad shall extend minimum 2 feet from the edge of each manhole. The concrete pad shall be 6-inch thick with #4 rebar at 18-inches on center. Slope concrete away from manholes with a 2% slope to allow for drainage away from manholes.
23. OWNER will provide fuel for the tank. CONTRACTOR to contact OWNER when fuel fill is required. Provide OWNER minimum 48 hours notice.
24. CONTRACTOR shall deliver to OWNER and provide copy for O&M manuals completed warranty information and certification.

B. Fuel Oil Piping

1. Apply joint compound, similar to Permatex No. 2, to male threads. Teflon tape not allowed.
2. Test piping under vacuum exceeding 20 inches of mercury or under pressure exceeding 50 psig. Piping shall remain under test for three hours without leakage.
3. Backfill fuel oil vent and containment piping with washed pea gravel with minimum bury of 18 inches. Install warning tape 6 inches above all piping and conduit.

C. Specialties

1. Oil tank gage rod stored in Mechanical Room.
2. Leak Detection System installed in strict accordance with manufacturer's instructions.

END OF SECTION

SECTION 15510 - HEATING BOILERS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes boilers, controls and boiler trim, hot water connections, fuel burning system and connections, and chimney connections.
- B. Related Sections:
 - 1. Section 15140 – Domestic Water Piping: Execution requirements for cold water piping connections to boilers specified by this section.
 - 2. Section 15120 - Piping Specialties: Product requirements for pressure gages required by this section.
 - 3. Section 15180 – Heating Piping: Execution requirements for hot water piping for piping connections to boilers specified by this section.
 - 4. Section 15190 – Fuel Piping: Execution requirements for oil piping connections to boilers specified by this section.

1.2 REFERENCES

- A. ASME SEC IV (American Society of Mechanical Engineers) - Boiler and Pressure Vessels Code - Rules for Construction of Heating Boilers.
- B. ASME SEC VIII DIV 1 (American Society of Mechanical Engineers) - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.
- C. NFPA 31 (National Fire Protection Association) - Installation of Oil Burning Equipment.
- D. UL 726 (Underwriters Laboratories, Inc.) - Oil-Fired Boiler Assemblies.

1.3 SUBMITTALS

- A. See Division 1 for specific requirements regarding: Contractor Submittals: Submittal procedures.
- B. Product Data: Submit general layout and dimensions. Include size and location of water, fuel, electric and vent connections, electrical characteristics, weight and mounting loads.
- C. Test Reports: Indicate specified performance and efficiency is met or exceeded. Provide combustion test that includes boiler firing rate, over fire draft, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent carbon dioxide (CO₂) percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, nozzle data and heat output.

- D. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturers Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.

1.4 CLOSEOUT SUBMITTALS

- A. See Division 1 for specific requirements regarding: Project Close-out: Closeout procedures.
- B. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.5 QUALITY ASSURANCE

- A. Conform to ASME SEC IV and UL 726 for construction of boilers.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- C. Perform Work in accordance with State standard and requirements.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept boilers and accessories on site in factory shipping packaging. Inspect for damage.
- B. Protect boilers from damage by leaving packing in place until installation.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 MAINTENANCE SERVICE

- A. Provide service and maintenance of boilers, burners, trim, and controls for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BOILERS

A. Manufacturers:

1. Weil McClain 580.
2. Substitutions: Meet specifications.

B. Boiler

1. General: Forced draft boiler with insulated jacket, sectional cast iron heat exchanger, fuel oil burning system, refractory and controls and boiler trim. Integral double wall tankless heater for domestic hot water production.
2. Provide water wall design consisting of water backed combustion area with water circulating around firebox.
3. Fabrication:
 - a. Assembly: Cast iron sections with 30 psig water ASME Boilers and Pressure Vessels Code rating, assembled with push nipples or gaskets and draw rods.
 - b. Provide access for flue passages for cleaning and flame observation ports.
 - c. Jacket: Glass fiber insulated steel jacket, finished with factory applied baked enamel.

C. Boiler Trim

1. ASME rated pressure relief valve, 30 psig.
2. Water pressure gage. Combination pressure and temperature gage not acceptable. Scale on pressure gage shall be graduated from 1-1/2 to 3 times the pressure relief valve set pressure. 4-inch diameter stainless steel ring and case, bronze tube, brass or bronze movement, brass socket. Front calibration. One percent accuracy. 0-60 psi.
3. Temperature Gage.
4. Burner pressure gage. 4-inch diameter stainless steel ring and case, bronze tube, brass or bronze movement, brass socket. Front calibration. One percent accuracy. 0-400 psi.
5. Electronic float type low water cut-off to prevent burner operation when boiler water falls below safe level. McDonnell Miller. Provide with McDonnell Miller TC4 test-n-check assembly.
6. Operating temperature controller with high and low temperature setpoints. Set to fire at 180F and shutoff at 200F.

7. High limit temperature controller with automatic reset for burner to prevent boiler water temperature from exceeding safe system temperature. Set at 210°F. Honeywell L4006 Series or equal.
8. Extra High limit temperature controller with manual reset for burner to prevent boiler water temperature from exceeding safe system temperature. Set at 225°F. Honeywell L4006 Series or equal.
9. Balanced draft damper.

D. Fuel Oil Burner

1. Description: High efficiency flame retention oil burner. Becket CF800-W or equal.
2. Burner Operation: On-Off fire for ignition.
3. Oil Burner: High pressure atomizing type for No. 1 or No. 2 fuel oil with combustion air blower, fuel pump, hinged flame inspection port, cadmium sulfide flame sensor, electrodes, ignition transformer, and oil nozzle.
4. Fuel Filter: Filter to be renewable. General 2A-700 or equal.
5. Oil Burner Safety Controls: Energize burner motor and electric ignition, 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.
6. 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.
7. Hour meter.
8. Electrical Characteristics
 - a. Division 16: Requirements for electrical characteristics.
 - 1) 1/2 hp
 - 2) 120 volts, single phase, 60 Hz.

E. Boiler Performance

1. See Schedules.
2. DOE seasonal efficiency (AFUE) (Annual Fuel Utilization Efficiency): 82 percent.

- F. Boiler Control:** Operating and high limit aquastats, low water cutoff, and other safeties by Boiler Manufacturer and installed by Mechanical Contractor. Connect to TEKMAR or similar control for automatic reset control of heating water supply temperature with outside air temperature.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with NFPA 31. Provide 30" x 24" minimum size steel drip pan with 1" high welded sides, under the burner. Provide for connection to electrical service. Refer to Division 16.
- B. Provide connection of fuel oil service in accordance with NFPA 31. Provide piping connections and accessories as indicated; refer to Sections 15060, 15120, 15140, 15180, and 15190. Pipe relief valves and drain valves to nearest floor drain. Low water cut off installed above the top of the boiler.
- C. Install burner pressure gage with gage cock.
- D. Test and adjust combustion rate of burner. Provide standard combustion test report.

3.2 DEMONSTRATION AND TRAINING

- A. Demonstrate operation and maintenance procedures.
- B. Provide minimum 2 hours on boiler/burner training.

END OF SECTION 15510

SECTION 15550 - CHIMNEYS

PART 1 - GENERAL

- 1.1 SCOPE: Scope of work includes providing breeching between the boiler outlet and the existing chimney connection point at ceiling of the boiler room.
- 1.2 REFERENCES
- A. NFPA 31 (ANSI Z95.1) (National Fire Protection Association) - Standard for the Installation of Oil Burning Equipment.
 - B. UL 103 (Underwriters Laboratories, Inc.) - Standard for Factory Built Low Heat Chimneys.
 - C. SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) – Guide for Steel Stack Construction.
- 1.3 DEFINITIONS
- A. Breeching: Vent Connector.
 - B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
 - C. 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.
- 1.4 DESIGN REQUIREMENTS
- A. Factory built vents, breechings, and chimneys used for venting natural draft appliances or negative pressure applications shall be UL listed and labeled. Site construction, existing conditions, and measurements provided to factory engineer by Contractor.
- 1.5 SUBMITTALS
- A. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breeching. Submit layout drawings indicating plan view and elevations.
 - B. Product Data: Submit data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 CHIMNEY

- A. Manufacturers (Negative Pressure – 1-inch Air Space):
 - 1. Selkirk MetalBestos Model SS.
 - 2. Ampco.
 - 3. Schebler
 - 4. No Substitutions.
- B. Provide double wall metal chimney, tested and UL listed, for use with building heating equipment, in compliance with NFPA 211.
- C. Fabricate with 1-inch airspace between walls. Construct inner jacket of 20 gage ASTM A167 Type 304 or Type 316 stainless steel. Construct outer jacket of 24 gage Type 316 stainless steel or aluminized steel.
- D. Accessories, UL labeled, fabricated of same materials as chimney:
 - 1. Support System.
 - 2. Cleanout Cap: Manifold Tee, Reducer, 90 degree elbow.
 - 3. Drain Section. Cleanout cap with tee.
 - 4. Appurtenances as required to install system required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with NFPA 31.
- B. Install breeching with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- C. Level and plumb chimney.
- D. Clean breeching and chimneys during installation, removing dust and debris.

- E. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breeching, breeching insulation, or chimneys.
- F. A drain at bottom of chimney is required.
- G. Maintain clearances to combustibles as required by manufacturer.

END OF SECTION 15550

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes metal ductwork and casing and plenums.
- B. Related Sections:
 - 1. Section 15060 – Hangers and Supports: Product requirements for hangers, supports and sleeves for placement by this Section.

1.02 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- C. NFPA 90A (National Fire Protection Association) - Installation of Air Conditioning and Ventilating Systems.
- D. NFPA 90B (National Fire Protection Association) - Installation of Warm Air Heating and Air Conditioning Systems.
- E. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) - HVAC Air Duct Leakage Test Manual.
- F. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) - HVAC Duct Construction Standards - Metal and Flexible.
- G. UL 181 (Underwriters Laboratories, Inc.) - Factory-Made Air Ducts and Connectors.

1.03 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1
- B. Product Data: Submit data for duct materials, duct fittings, duct construction, duct connectors.
- C. Product Data: Submit data for duct materials, duct fittings, duct construction, access doors, and duct connectors.

1.04 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

- A. Perform WORK in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing WORK of this section with minimum three years documented experience.
- C. All sheet metal workers shall have a minimum documented sheet metal fabrication and installation experience in commercial or industrial facilities of 3 years or be enrolled in an Alaska Department of Labor approved Sheet Metal Apprentice program. The ratio of on-site workers shall not exceed 3 apprentices or sheet metal workers for every one foreman. A foreman is defined as a sheet metal worker with minimum 3 years experience as detailed above or is an approved Journeyman.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealant or metal foil tape when temperatures are less than those recommended by manufacturers.
- B. Maintain temperatures during and after installation of duct sealant or metal foil tape.
- C. Particular care shall be taken in storage and handling of such materials to maintain its clean condition. Provide temporary end caps and closures on ductwork and fittings until ready for immediate use. Maintain in place until installation. Store ductwork in clean, enclosed from weather, location at all times. Ductwork is not to be stored in direct contact with dirty surfaces or on dirt floor. If ductwork and components are found to be improperly stored they shall be removed from the project immediately and new materials shall be used.

1.08 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is permitted except by written permission.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.01 DUCT MATERIALS

- A. Manufacturers:
 - 1. Acme Manufacturing Co.
 - 2. Semco
 - 3. United McGill Sheet Metal
- B. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G60 zinc coating in conformance with ASTM A90.
- C. Fasteners: Rivets, bolts, or sheet metal screws.
- D. Hanger Rod: ASTM A36; steel or continuously threaded.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Flanged closures must be SMACNA "J" rated with minimum 1-3/8 inch flange. Flange shall be gasketed. Corners bolted. Metal cleat for application around perimeter of transverse joint.
- E. Transverse joints: Ductmate proprietary duct connections will be accepted. Ductwork constructed using these systems will refer to manufacturers guidelines for sheet gage, intermediate reinforcement size and spacing, and joint reinforcement. TDF shall be constructed in accordance with SMACNA – HVAC Duct Construction Standards Manuals T-24 flange. Basis for evaluating a substitution shall be Ductmate Joining System, all steel construction. Ductmate system shall utilize minimum 20 gage steel companion angles, 12 gage steel corner pieces, and an integral polymer mastic seal. Acceptable joining systems: Ductmate 35, Nexus, Accuct, or TDF. TDC is not acceptable.
- F. Longitudinal seams and fitting: Pittsburgh lock or snap lock shall be used on all longitudinal seams. Use Pittsburgh only on fittings, snap lock is not acceptable.

2.03 DUCT, CASING AND PLENUM SEALANTS

- A. Foil Tape: 2-mil aluminum foil self-adhesive tape. Similar to Fasson, Polyken.
- B. Sealant: UL listed vinylacrylic or copolymer based duct sealer. Similar to Durodyne DDS-181, Uni-mastic 181.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify sizes of equipment connections before fabricating transitions.

3.02 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. See Section 3.2.D. for requirements. Use double nuts and lock washers on threaded rod supports.
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system. Check daily or more frequently that sealing of ducts is intact.
- C. Duct Sealing:
 - 1. Seal all longitudinal and latitudinal joints of metal ducts with foil tape or two coats of sealant. Apply sealant in accordance with manufacturer's recommendations. Apply second coat of sealant after first coat has completely cured. Inspect seams with ductwork pressurized and reapply as required for an airtight application.

3.03 SCHEDULES

- A. Ductwork Material Schedule
 - 1. Equipment and Material
 - a. Supply Fan AHU: Steel
- B. Ductwork Pressure Class Schedule
 - 1. Air System Pressure Class
 - a. Supply Fan AHU: 2 inch wg

END OF SECTION 15810

SECTION 15915 - ELECTRONIC CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electronic thermostats, relays, controllers, wiring, and miscellaneous accessories.
- B. Related Sections:
 - 1. Section 15120 – Piping Specialties: Product requirements for thermometer sockets for placement by this section.
 - 2. Section 15510 – Heating Boilers and Accessories: Product requirements for placement by this section.
 - 3. Division 16 Drawings: Execution requirements and Product for electric connections specified by this section.

1.2 REFERENCES

- A. ASME MC85.1 (American Society of Mechanical Engineers) - Terminology for Automatic Control.
- B. NFPA 90A (National Fire Protection Association) - Installation of Air Conditioning and Ventilation Systems.

1.3 SYSTEM DESCRIPTION

- A. Provide electronic control systems consisting of thermostats, controllers, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified. Scope of work includes providing controls necessary for the Heating Plant of the Haines public Safety Building and interfacing with existing room thermostats and control valves.

1.4 SUBMITTALS

- A. See Division 1 for specific requirements regarding: Submittal procedures. Ladder diagrams required with all applicable submittals.
- B. Shop Drawings: Indicate all operating data, system drawings, piping and wiring diagrams, and written detailed operational description of sequences. Provide complete ladder diagram showing sequences, relays, lights, accessories and all safeties specified and shown.
- C. Product Data: Submit Provide description and engineering data for each control system component. Include sizing as requested. For automatic valves indicate size, flow, and pressure drop for each valve.

- D. Manufacturer's Installation Instructions: Submit.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Field Report: Indicate operating conditions after detailed check of systems at Date of Substantial Completion.

1.5 CLOSEOUT SUBMITTALS

- A. See Division 1 for specific requirements regarding: Closeout procedures.
- B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Revise shop drawings to reflect actual installation and operating sequences.
- C. Operation and Maintenance Data: Submit systems descriptions, set points, and controls settings and adjustments. Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented] experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.8 WARRANTY

- A. See Division 1 for specific requirements regarding: Product warranties and product bonds.

1.9 MAINTENANCE SERVICE

- A. See Division 1 for specific requirements regarding: Requirements for maintenance service.
- B. Provide service and maintenance of control system for one years from Date of Substantial Completion.
- C. Provide complete service of controls systems, including callbacks. Inspect, calibrate, and adjust controls, and submit written reports.

PART 2 - PRODUCTS

2.1 ELECTRONIC CONTROLS

- A. Manufacturers:
 - 1. TEKMAR.
 - 2. Honeywell.
 - 3. Substitutions: See Division 1 for specific requirements.

2.2 CONTROL WIRING

- 1. Includes all control wiring to complete the system and provide control arrangements specified or shown on the drawings. Low voltage wiring in exposed areas contained in metallic tubing otherwise protected as required. All low voltage control wiring 18 AWG minimum.

2.3 THERMOSTATS

- 1. Outdoor Reset Thermostat: Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint. Scale range: -10 to 70 degrees F.
- 2. Immersion Thermostat: Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.

2.4 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Division 16: Requirements for electrical characteristics.

2.5 SEQUENCE OF OPERATION

- A. See Sheet M501.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. See Division 1 for specific requirements regarding: Coordination and project conditions.
- B. Verify that building systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

3.3 FIELD QUALITY CONTROL

- A. After completion of installation, test and adjust control equipment. Submit data showing set points and final adjustments of controls. Check calibration of instruments. Recalibrate or replace.

3.4 FIELD COORDINATION

- A. Assist Balancing Contractor as required for complete manipulation of control sequences. Full open and full closed positions of valves shall be obtainable as required for adjustment, measurement, and recording of the mechanical systems.

END OF SECTION 15915

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes testing, adjusting, and balancing of hydronic systems for the Heaines Public Safety Heating Plant Renovation.
- B. Scope of Work: Adjust and balance building hydronic systems at the Heating Plant only. Flow rates for Heating Plant hydronic systems are shown on the schedules. Coordinate with contract document requirements.
- C. Related Sections:
 - 1. Drawings and general provisions of the Contract, including General, Supplementary Conditions, and all Division Specification Sections, apply to this Section.

1.2 REFERENCES

- A. ASHRAE 111 (American Society of Heating, Refrigerating and Air-Conditioning Engineers) - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- B. NEBB (National Environmental Balancing Bureau) - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.3 SUBMITTALS

- A. General: Provide submittal procedures according to Conditions of Contract and Division 1 Specifications Sections.
- B. Test Reports: Indicate data on forms prepared following NEBB Report forms.
- C. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Prior to commencing WORK, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- E. Submit draft copies of report for review prior to final acceptance of Project. Upon completion of WORK if balancing report submittal is not approved, all return trips to site for additional WORK and resubmittal of report to meet specified parameters shall be done at no additional cost to the OWNER. Provide final copies for PROJECT MANAGER and for inclusion in operating and maintenance manuals.

- F. Provide reports in soft cover, letter size, binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of flow setters.

1.5 QUALITY ASSURANCE

- A. Perform WORK in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Certificates of current calibration of equipment submitted prior to adjustment.

1.6 QUALIFICATIONS

- A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with minimum three years documented. Provide documentation with references meeting experience requirements for approval.

1.7 SEQUENCING

- A. Sequence balancing between completion of systems tested and Date of Substantial Completion.
- B. Coordinate adjustment with controls Subcontractor. Controls Subcontractor contractor shall be on-site throughout adjustment to operate controls for all required testing scenarios.

1.8 SCHEDULING

- A. See Division 1 for specific requirements regarding: Coordination and project conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing WORK. Ensure the following conditions:

1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
- B. Submit field reports. Report defects and deficiencies noted during performance of services, which prevent system balance.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to PROJECT MANAGER to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

- A. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Adjust Heating plant flow setters and measure building pumps as shown on the drawings and as directed in Article 1.1 SUMMARY above.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Final measurements shall be taken and recorded after systems have been completely adjusted.
- F. Leave systems in proper working order, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 ADJUSTMENT PROCEDURE

- A. Specific Requirements:
1. Notify the PROJECT MANAGER seven days prior to beginning WORK at the site. Provide a schedule of when each phase of the WORK will be performed and when inspection by the PROJECT MANAGER will be required. As the WORK proceeds, provide the PROJECT MANAGER daily progress updates.
 2. Notify the PROJECT MANAGER of locations where objectionable noise is generated by the mechanical systems prior to completing adjustment.

3. Inspection: The Adjustment Subcontractor shall not conclude WORK at the site until the PROJECT MANAGER has inspected the WORK. Minimum of two weeks notice is required.
 - a. Provide personnel and equipment to verify to the PROJECT MANAGER that the systems are adjusted properly.
 - b. Disapproval of the adjustment submittal by the PROJECT MANAGER will require readjustment by the CONTRACTOR and re-inspection at no additional cost to the OWNER.
 - c. Inspection Requirements: The systems will be checked by the CONTRACTOR with the PROJECT MANAGER present for proper adjustment at each of the required adjustment procedures.

B. Water System Procedure

1. General

- a. Adjust water systems, after air balancing, to provide design quantities.
- b. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- c. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- d. Effect system balance with automatic control valves fully open or in normal position to heat transfer elements.
- e. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- f. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

2. Pumps:

- a. Adjust for design GPM.
- b. Measure pressure difference across pump.

3.6 REPORT FORMS

1. Title Page:

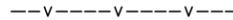
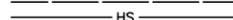
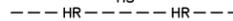
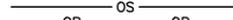
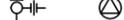
- a. Name of Testing, Adjusting, and Balancing Agency
- b. Address of Testing, Adjusting, and Balancing Agency
- c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
- d. Project name
- e. Project location
- f. Project Manager

- g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
2. Summary Comments:
- a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Nomenclature used throughout report
 - e. Test conditions
3. Instrument List:
- a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date
4. Electric Motors:
- a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP and kW
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements
5. Pump Data:
- a. Identification/number
 - b. Manufacturer
 - c. Size/model
 - d. Impeller
 - e. Service
 - f. Design flow rate, pressure drop, BHP and kW
 - g. Actual flow rate, pressure drop, BHP and kW
 - h. Discharge pressure
 - i. Suction pressure
 - j. Total operating head pressure
 - k. Shut off, discharge and suction pressures
 - l. Shut off, total head pressure
6. Heating Data:
- a. Identification/number

- b. Location
- c. Service
- d. Manufacturer
- e. Water flow, design and actual
- f. Water pressure drop, design and actual
- g. Entering water temperature, design and actual
- h. Leaving water temperature, design and actual
- i. Entering air temperature, design and actual
- j. Leaving air temperature, design and actual

END OF SECTION 15950

SYMBOLS

 CW  HW  V  W  RD  HS  HR  OS  OR	<p>COLD WATER HOT WATER VENT WASTE, SOIL, DRAINAGE ROOF DRAINAGE HEATING SUPPLY HEATING RETURN OIL SUCTION OIL RETURN</p>	                     	<p>PITCHED DOWN REDUCER CAPPED OR PLUGGED STRAINER TEST PORT/PLUG WATER FEEDER PUMP SAFETY OR RELIEF VALVE POINT OF CONNECTION OR REMOVAL CONSTRUCTION NOTE THERMOSTAT - IMMERSION, ROOM THERMOMETER PRESSURE GAGE CONTROL SWITCH DIAMETER CENTER LINE ACCESS DOOR BELOW GRADE EXISTING TO BE REMOVED CONCRETE WALL/FLOOR LINE BREAK</p>
--	---	--	--

 ISOLATION VALVE  CHECK VALVE  UNION  AUTOMATIC VALVE  FLOWSETTER W/NO.  GLOBE VALVE OR ISOLATING BALL VALVE  BALL VALVE  DRAIN VALVE  AFF  AV  EA  EAT  ET  FD-1  LV  LWT  MBH  MH  NC  NO  OC  OSA  PSI  TYP  V	<p>ISOLATION VALVE CHECK VALVE UNION AUTOMATIC VALVE FLOWSETTER W/NO. GLOBE VALVE OR ISOLATING BALL VALVE BALL VALVE DRAIN VALVE ABOVE FINISHED FLOOR AUTOMATIC VALVE EXHAUST AIR ENTERING AIR TEMPERATURE EXPANSION TANK FLOOR DRAIN LOUVER LEAVING WATER TEMPERATURE 1,000 BTU PER HOUR MANHOLE NORMALLY CLOSED NORMALLY OPEN ON CENTER OUTSIDE AIR POUNDS PER SQUARE INCH TYPICAL VENT</p>
--	---

HEATING EQUIPMENT SCHEDULE

EQUIPMENT	MANUFACTURER AND MODEL	CAPACITY	FEATURES
BOILER, B-1	WEIL-McLAIN 580	448,000 BTU/HR NET IBR	CAST-IRON SECTIONAL, WITH IMMERSION HW COIL. COMPLETE PACKAGE INCLUDING LOW WATER CUTOFF, OPERATING THERMOSTAT CONTROL SET AT 200°F WITH 10°F DIFFERENTIAL, HIGH AND EXTRA LIMIT WITH MANUAL RESET THERMOSTATS, PRESSURE RELIEF VALVE, FLUE COLLAR WITH BREECHING DAMPER, AND BAROMETRIC DAMPER. SPARE PRESSURE RELIEF VALVE AND THERMOSTATS STORED IN MECHANICAL ROOM IN ORIGINAL PACKAGING. ALL CONTROLS TO BE IMMERSION TYPE WITH WELLS, STRAP-ON TYPE NOT ALLOWED.
BURNER, B-1	BECKETT, CF800-W	4.45 GPH, 1/3 HP, 120V/1-PHASE	NATURAL DRAFT. LIGHT OIL BURNER. ON-OFF OPERATION, FIXED AIR. COMPLETE SET OF SPARE PARTS STORED IN MECHANICAL ROOM IN ORIGINAL PACKAGING CONSISTING OF FAN MOTOR, OIL PUMP, COUPLING, HONEYWELL 8184 PROGRAMMER, TRANSFORMER, FLAME DETECTOR, SOLENOID VALVE, COMPLETE SET OF ELECTRODES, AND LIST OF SPARE PARTS. TIME/RUN CLOCK.
CHIMNEY	SCHEBLER	-	8" DOUBLE WALL CHIMNEY RATED FOR NEGATIVE PRESSURE. STAINLESS STEEL INNER AND OUTER CONSTRUCTION.
AIR SEPARATOR	TACO	435	FOR 2-1/2" PIPE SIZE. WITH REMOVABLE STRAINER. AIR VENT ON TOP. CONNECTION TO EXPANSION TANK AND COLD WATER SUPPLY ON TOP. WITH 1" VALVED BLOWDOWN.
EXPANSION TANK ET-1	AMTROL	AX-100(H)	DIAPHRAGM EXPANSION TANK WITH REMOVABLE BLADDER. 55 GALLON CAPACITY. HORIZONTAL.
EXPANSION TANK ET-2	EXTROL	THERM-A-TROL	FOR POTABLE WATER USE. 5 GALLON CAPACITY.

PUMP SCHEDULE

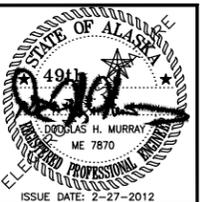
PUMP NUMBER	FUNCTION	GALLONS PER MINUTE (GPM)	HEAD DEVELOPED (FT. OF WATER)	DESIGN MANUFACTURER AND MODEL	MINIMUM HORSEPOWER ELECTRICAL CHARACTERISTICS	FEATURES
P-1	HEATING UNITS SOUTH 1ST FLOOR	4	12	TACO 0010	1/8, 120V	UNITIZED, INTEGRAL TEST PORTS. PROVIDE SPARE PUMP.
P-2	HEATING UNITS APPARATUS BAY	14	15	TACO 0014	1/8, 120V	UNITIZED, INTEGRAL TEST PORTS. PROVIDE SPARE PUMP.
P-3	HEATING UNITS FIRST FLOOR	9	14	TACO 0011	1/8, 120V	UNITIZED, INTEGRAL TEST PORTS. PROVIDE SPARE PUMP.
P-4	HEATING UNITS SOUTH 2ND FLOOR	7	12	TACO 0010	1/8, 120V	UNITIZED, INTEGRAL TEST PORTS.
P-5	BOILER LOOP	22	7	TACO 0010 VS	1/8, 120V	UNITIZED, VARIABLE SPEED, INTEGRAL TEST PORTS. PROVIDE SPARE PUMP.
P-6	DOMESTIC HOT WATER	8	6	TACO 005	1/8, 120V	UNITIZED, BRONZE FITTED, SUITABLE FOR POTABLE WATER, INTEGRAL TEST PORTS.

FLOWSETTER SCHEDULE

NUMBER	UNIT SERVED	AREA SERVED	LOCATION	DESIGN GPM	FLOWSETTER SIZE (INCHES)
1	BOILER	BOILER	MECHANICAL ROOM	22	1-1/2
2	PUMP P-2	APPARATUS BAY ZONE 1	MECHANICAL ROOM	8	1-1/4
3	PUMP P-2	APPARATUS BAY ZONE 2	MECHANICAL ROOM	3	3/4
4	PUMP P-2	APPARATUS BAY ZONE 3	MECHANICAL ROOM	3	3/4
5	PUMP P-4	SECOND FLOOR ZONE 1	MECHANICAL ROOM	5	1"
6	PUMP P-4	SECOND FLOOR ZONE 2	MECHANICAL ROOM	2	3/4
7	PUMP P-3	FIRST FLOOR	MECHANICAL ROOM	9	1-1/2
8	PUMP P-1	FIRST FLOOR SOUTH	MECHANICAL ROOM	4	3/4
9	PUMP P-6	HW TANK	MECHANICAL ROOM	8	3/4

DRAWING INDEX

SHEET NUMBER	SHEET TITLE
M100	SYMBOLS & SCHEDULES
M101	BOILER ROOM PLANS - DEMOLITION
M201	BOILER ROOM PLANS
M301	HEATING PLANT PIPING DIAGRAM
M401	DETAILS
M501	CONTROLS
M601	FUEL TANK - ALTERNATE WORK



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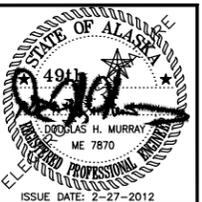
P O BOX 21081
JUNEAU, ALASKA 99802
TEL: 907 780-6151
FAX: 907 780-6182

HAINES PUBLIC SAFETY
HEATING PLANT RENOVATION
JUNEAU, ALASKA

SHEET TITLE:
SYMBOLS & SCHEDULES

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M100



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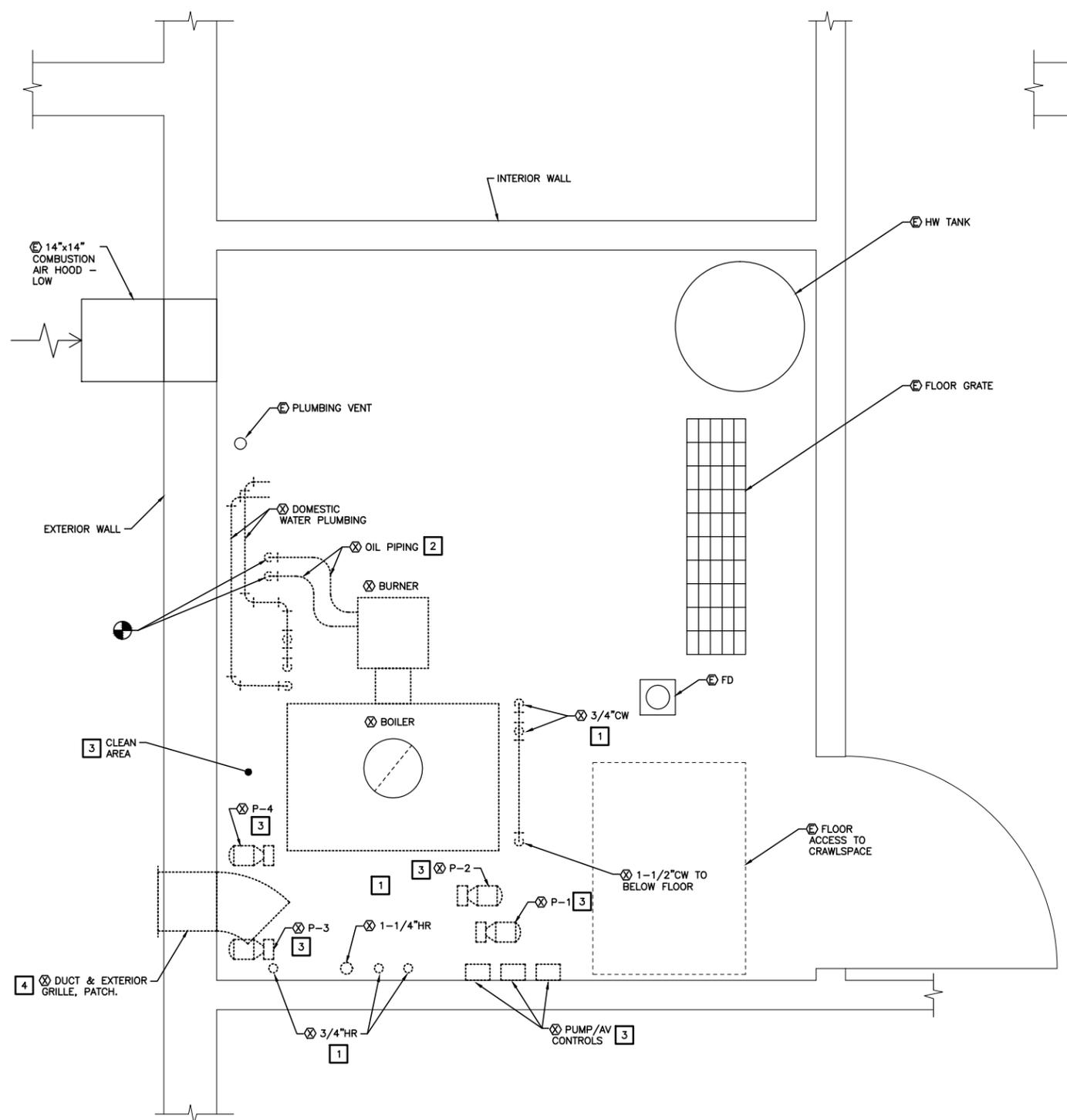
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FAX: 907 780-6182

**HAINES PUBLIC SAFETY
HEATING PLANT RENOVATION
JUNEAU, ALASKA**

SHEET TITLE:
BOILER ROOM PLANS
- DEMOLITION

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

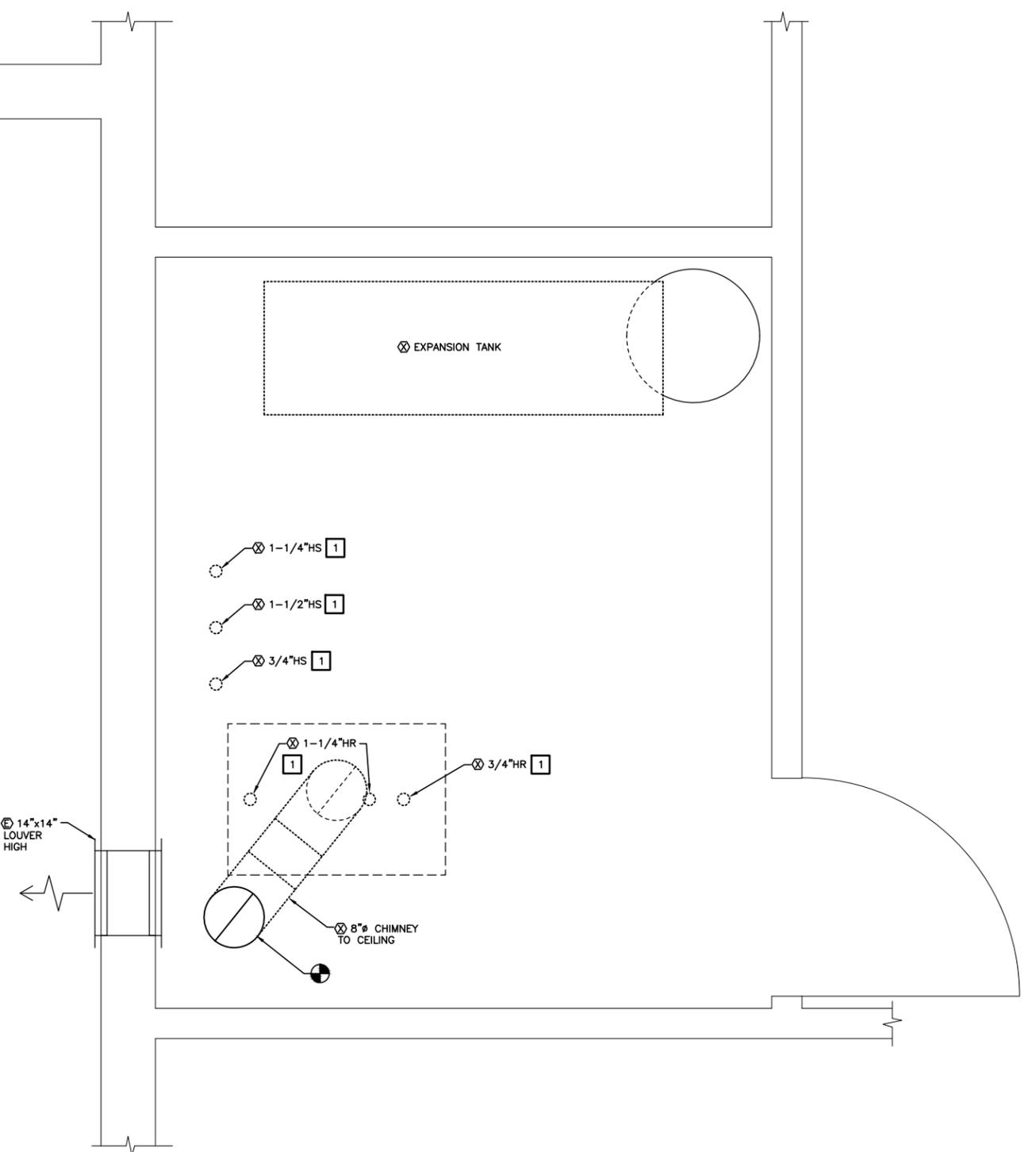
SHEET NO.
M101



1 BOILER ROOM PLAN - LOWER
SCALE: 0 6" 1' 2'



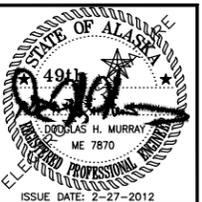
- CONSTRUCTION NOTES:**
- 1** REMOVE PIPING, TRIM, AND SUPPORTS TO CEILING OR FLOOR.
 - 2** REMOVE OIL PIPING THROUGH FLOOR PENETRATION TO CRAWLSPACE.
 - 3** REMOVE ENTIRE PUMP, CONTROLS, AND RELATED TRIM, PREPARE SURFACE, REPAIR 4 FOOT HIGH.
 - 4** REMOVE HOOD OR LOUVER. PATCH EXTERIOR WALL, MATCH WOOD SIDING, PRIME AND PAINT TO MATCH EXISTING.



2 BOILER ROOM PLAN - UPPER
SCALE: 0 6" 1' 2'



- SHEET NOTES:**
- 1.** SEE DEMOLITION DIAGRAM ON SHEET M301 FOR ADDITIONAL DEMOLITION WORK.



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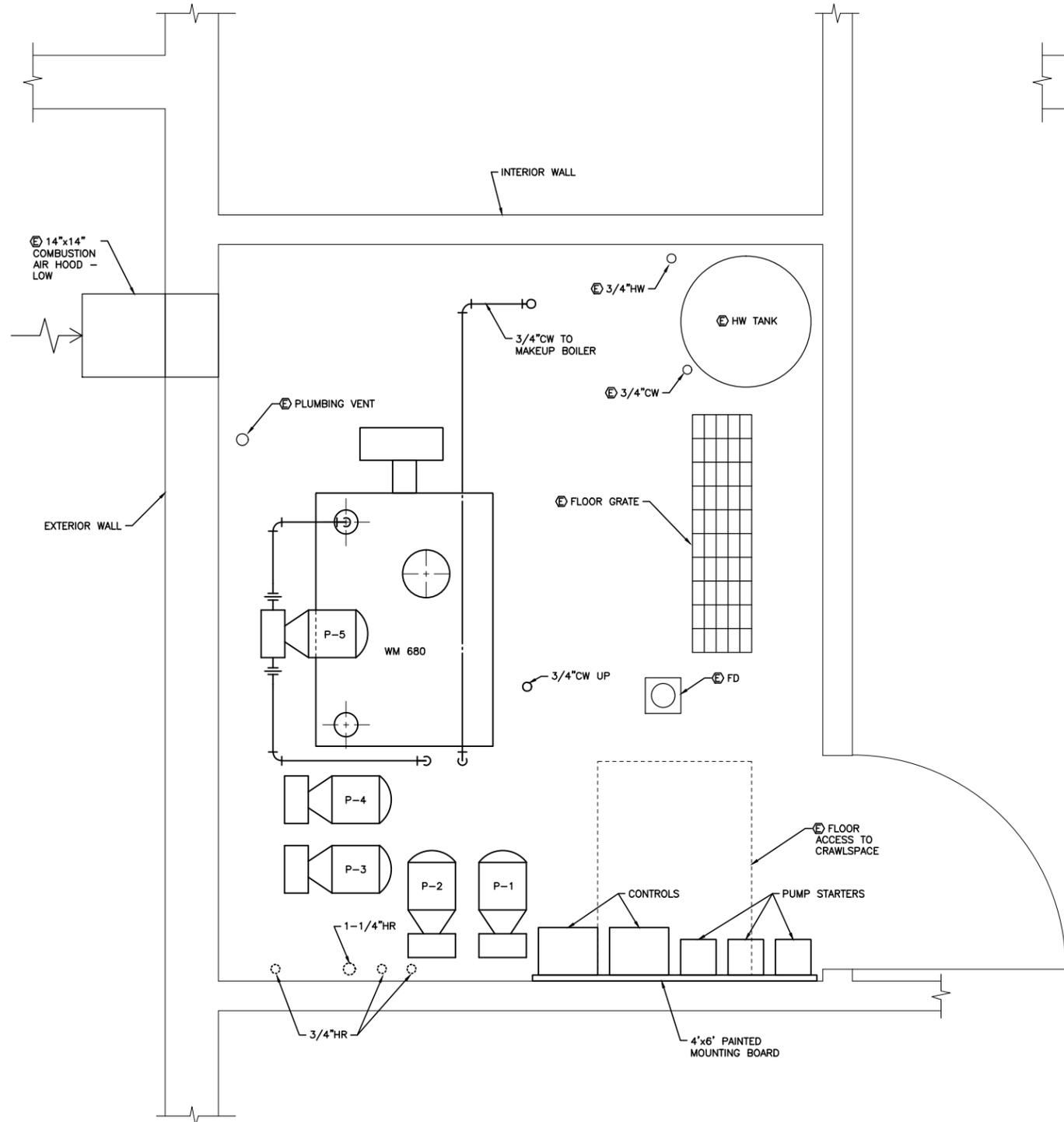
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HEATING PLANT RENOVATION
JUNEAU, ALASKA**

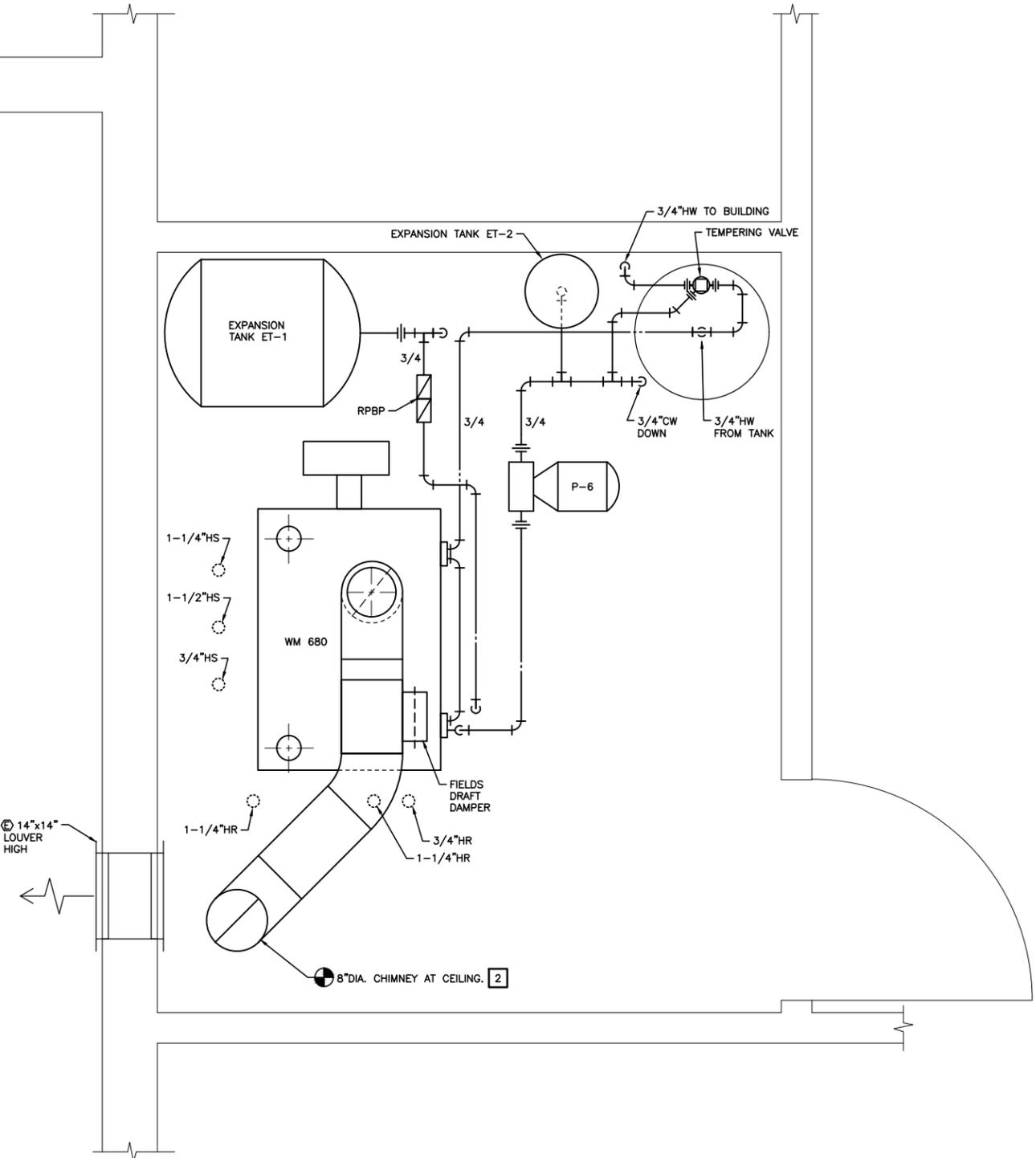
SHEET TITLE:
BOILER ROOM PLANS

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M201



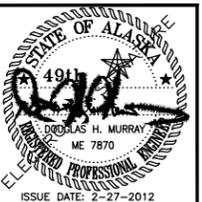
1 BOILER ROOM PLAN - LOWER
SCALE: 0 6" 1' 2'
PROJECT NORTH



2 BOILER ROOM PLAN - UPPER
SCALE: 0 6" 1' 2'
PROJECT NORTH

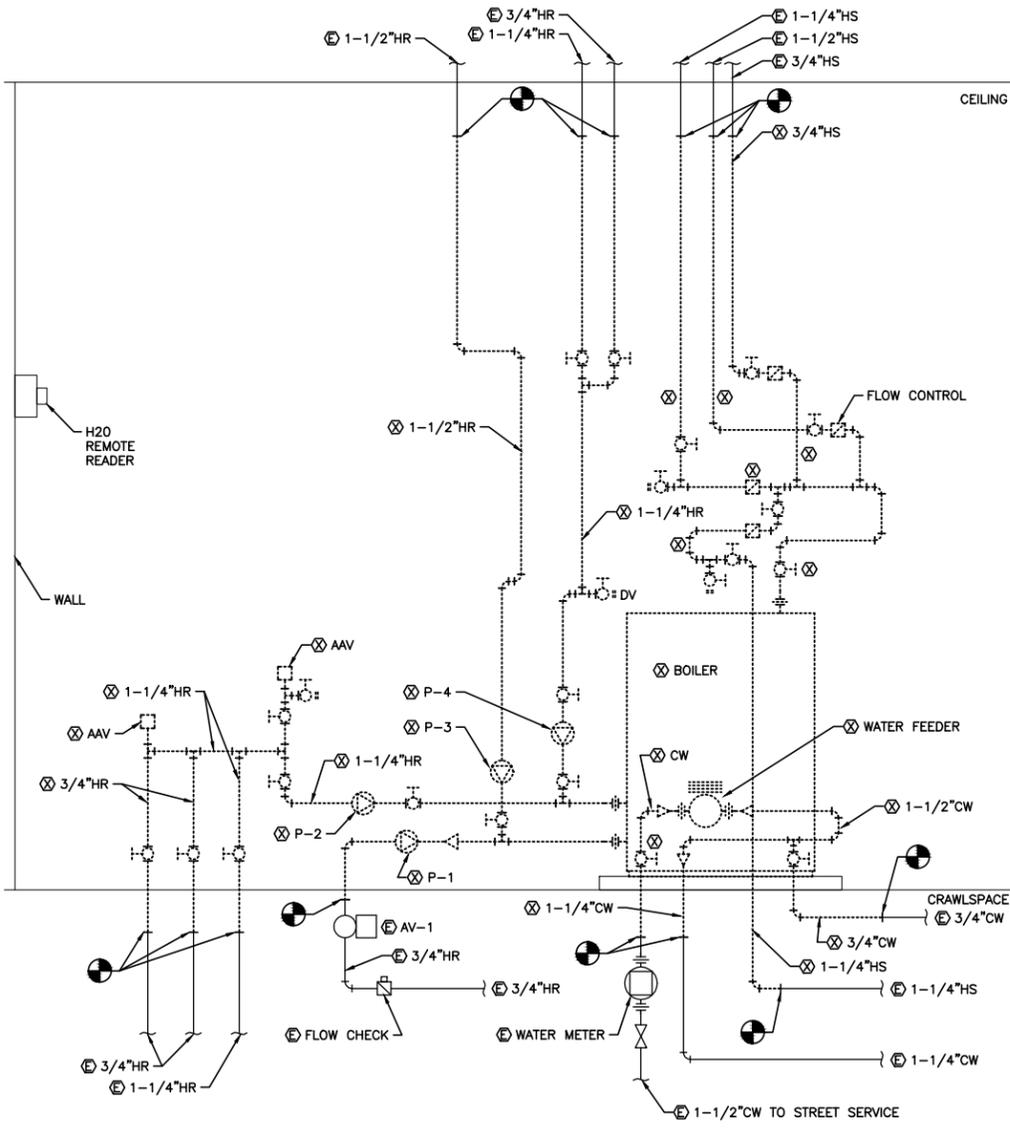
- CONSTRUCTION NOTES:**
- 1** INSTALL 3/4" ANTI-SCALD TEMPERING VALVE WITH THERMOMETER ON OUTLET OF HW TANK. MODIFY CW AND HW PIPING ACCORDINGLY.
 - 2** CLEAN ENTIRE TWO STORY CHIMNEY.

- SHEET NOTES:**
- 1. SEE DIAGRAM ON SHEET M301 FOR CONFIGURATION, PIPE SIZES, VALVES, & TRIM REQUIRED.

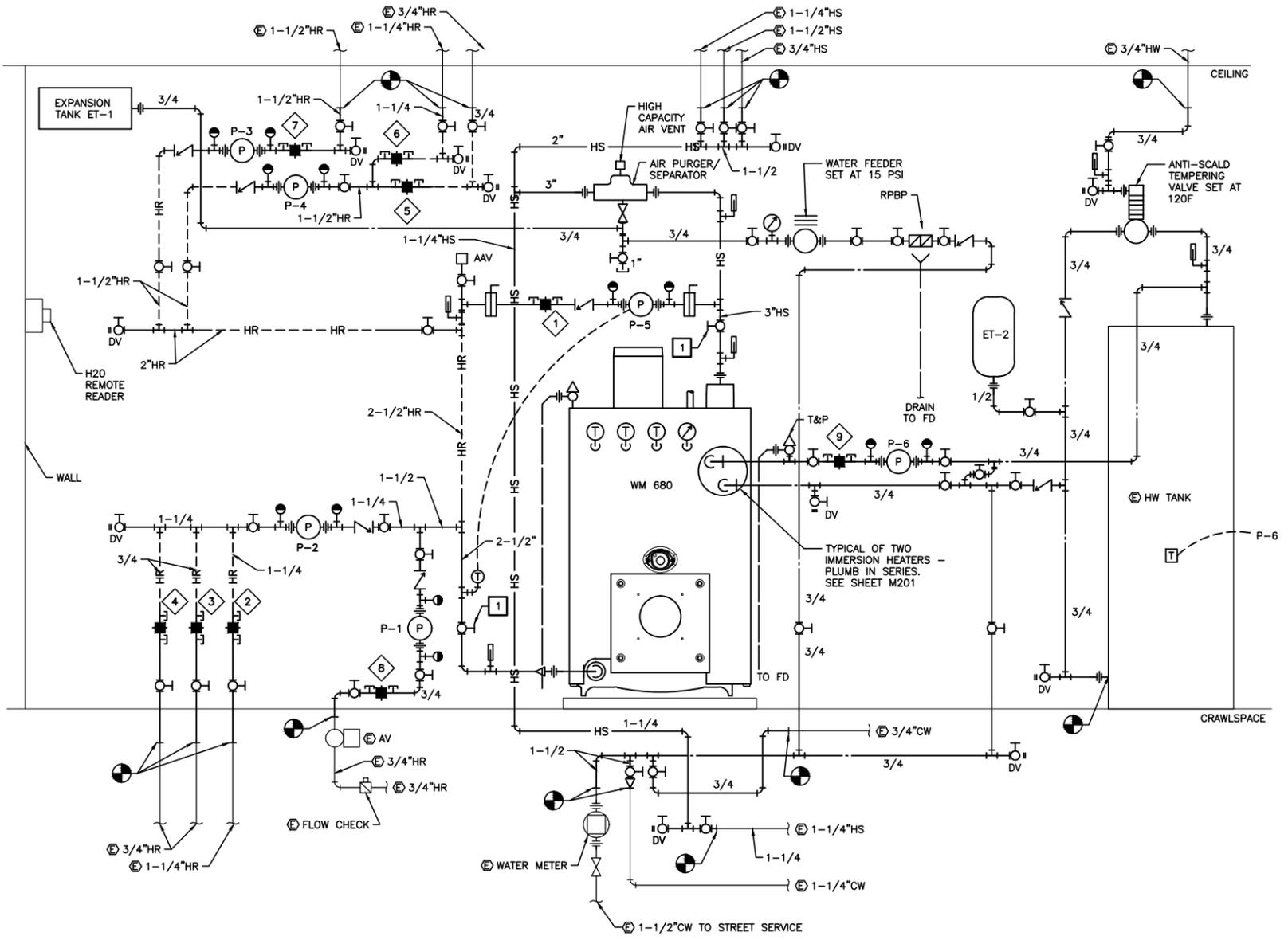


CONSTRUCTION NOTES:

1 INDICATOR TYPE VALVE.



1 HEATING PLANT PIPING DIAGRAM – DEMOLITION
NO SCALE



2 HEATING PLANT PIPING DIAGRAM – NEW
NO SCALE

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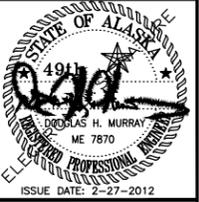
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TEL: 907 780-6151
FAX: 907 780-6182

HAINES PUBLIC SAFETY
HEATING PLANT RENOVATION
JUNEAU, ALASKA

SHEET TITLE:
HEATING PLANT
PIPING DIAGRAM

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M301



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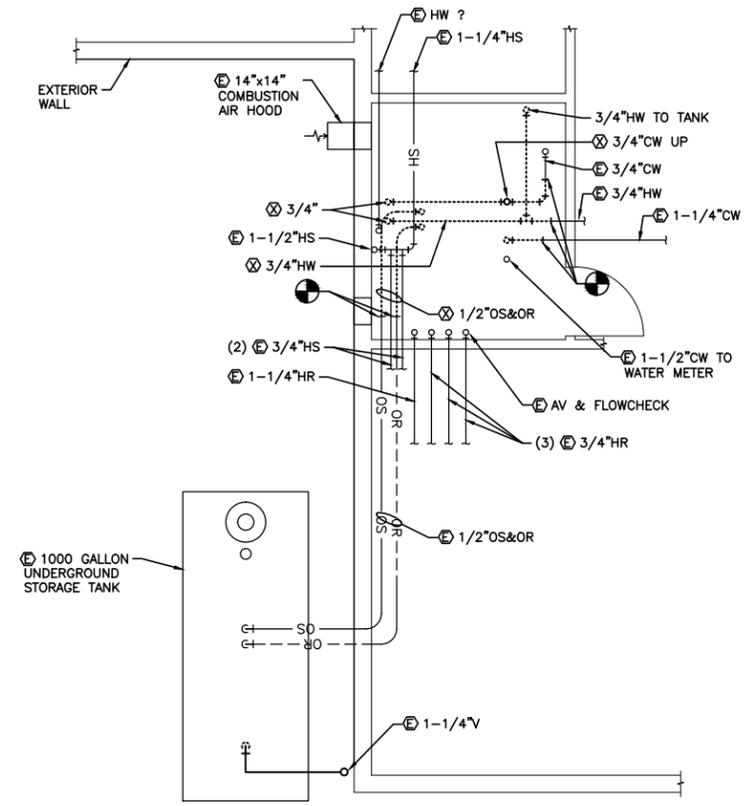
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HEATING PLANT RENOVATION
JUNEAU, ALASKA

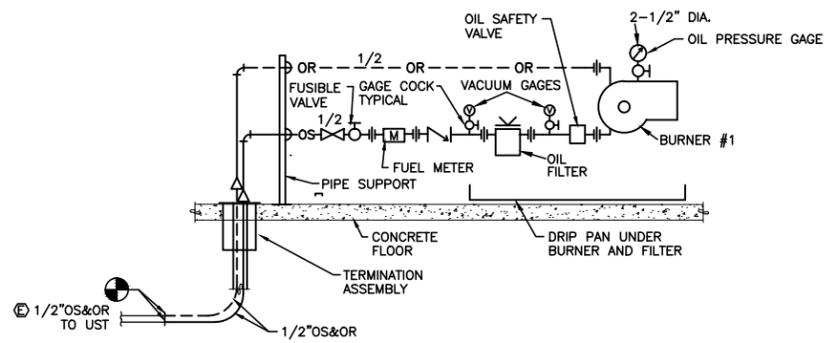
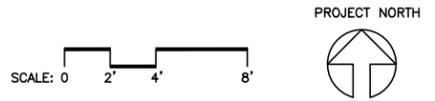
SHEET TITLE:
OIL DIAGRAM,
CRAWLSPACE PLAN

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M401



1 CRAWLSPACE PLAN - BASE BID



2 OIL PIPING DIAGRAM - BASE BID
NO SCALE



SEQUENCE OF OPERATIONS

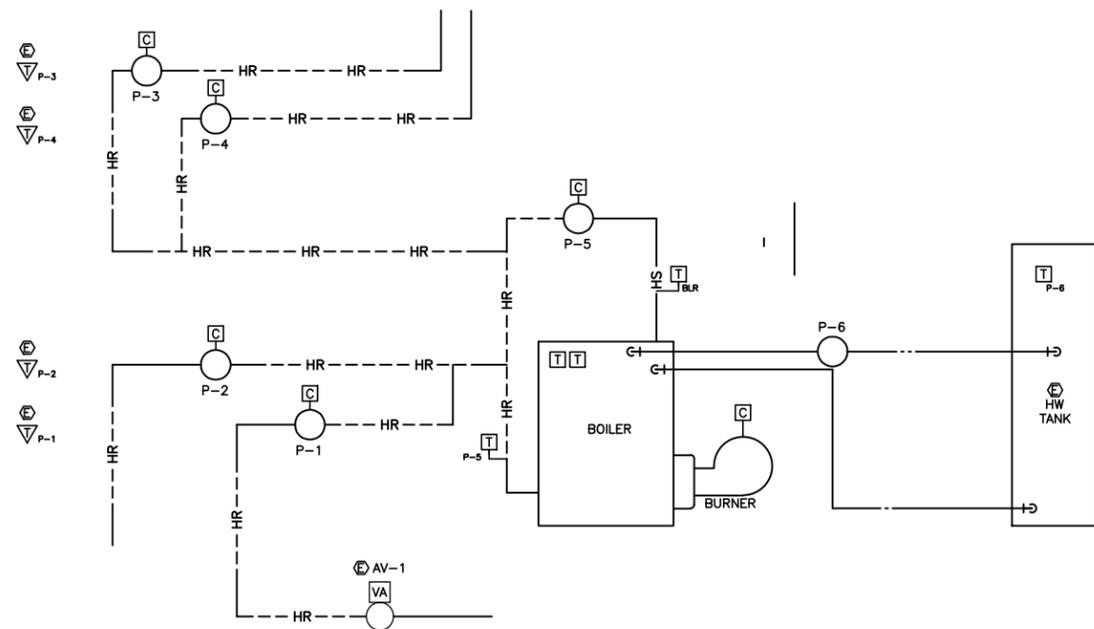
- HEATING PLANT OPERATION: MICROPROCESSOR BASED CONTROL PANEL TO CONTROL THE BURNER. INDIVIDUAL BOILER CONTROLS TO OPERATE BURNER ACCORDING TO BOILER SAFETIES (LWCO AND HIGH TEMPERATURE LIMITS) AND OPERATING CONTROL. BOILER CONTROL PANEL TO MODULATE ACCORDING TO RESET SCHEDULE AS FOLLOWS: HEATING WATER SET POINT FROM 190F AT OUTSIDE AIR TEMPERATURE OF 30F AND MODULATE DOWN TO 150F AT 60F OUTSIDE AIR TEMPERATURE.
- HS BOILER CIRCULATION PUMP P-5 OPERATES WHENEVER THE BURNER OPERATES AND IF THE IMMERSION THERMOSTAT IN THE HEATING RETURN IS BELOW 140F ADJUSTABLE.
- ZONE PUMP OPERATION: ROOM THERMOSTATS TO CONTROL OPERATION OF THE RESPECTIVE CIRCULATION PUMP FOR THE HEATING ZONE. IN ADDITION AT LEAST ONE ROOM THERMOSTAT IS TO OPEN AUTOMATIC VALVE TO PART OF THE RESPECTIVE HEATING ZONE AS WELL AS OPERATE THE CIRCULATING PUMP THROUGH AN END SWITCH.
 - PUMP P-1: AN EXISTING PROGRAMMABLE THERMOSTAT IN ASSEMBLY MEETING ROOM CONTROLS PUMP P-1. IN ADDITION ROOM THERMOSTAT OPENS THE EXISTING LOW VOLTAGE AUTOMATIC VALVE AV-1.
 - PUMP P-2: AN EXISTING WALL MOUNTED ROOM THERMOSTAT IN APPARATUS BAY IN FIRE DEPT CONTROLS PUMP P-2.
 - PUMP P-3: AN EXISTING WALL MOUNTED ROOM THERMOSTAT IN DISPATCH CONTROLS PUMP P-3.
 - PUMP P-4: AN EXISTING WALL MOUNTED ROOM THERMOSTAT IN FACILITY MAINTENANCE OFFICE CONTROLS PUMP P-4.
 - PUMP P-6: AN IMMERSION THERMOSTAT IN HOT WATER TANK CONTROLS PUMP P-6.

CONTROLS LEGEND

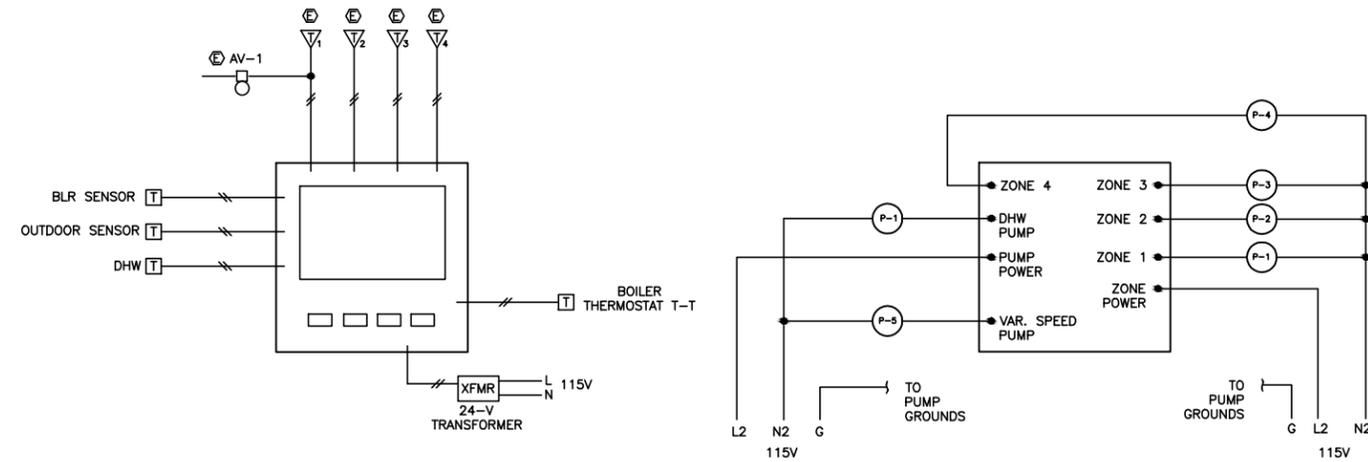
□	CONTROLLER	AHU	AIR HANDLING UNIT
T	IMMERSION THERMOSTAT OR THERMOSTATIC SENSOR	B-1	BOILER
VA	VALVE ACTUATOR	COM	COMMON
P	PUMP	G	GROUND
▽	ROOM THERMOSTAT	HR	HEATING RETURN
←	AIR DIRECTION	HS	HEATING SUPPLY
⊥	THERMOMETER	L1,L2	115V POWER
M	MOTOR	LL	LOW LIMIT CONTROL
\$	CONTROL SWITCH	MA	MIXED AIR
		N	NEUTRAL
		NC	NORMALLY CLOSED
		OAD	OUTSIDE AIR DAMPER
		OSA	OUTSIDE AIR
		P-1	PUMP
		RA	RETURN AIR
		RAD	RETURN AIR DAMPER

GENERAL NOTES:

- THE DIAGRAMS AND POINTS SHOWN HERE ARE SCHEMATIC ONLY AND IS NOT INTENDED TO BE COMPLETE WIRING DIAGRAMS. REFER TO SEQUENCE OF OPERATIONS FOR ADDITIONAL INFORMATION. COORDINATE WITH ALL OTHER DISCIPLINES TO ACHIEVE RESULTS AS SHOWN AND INTENDED HEREUNDER IN THE DOCUMENTS. GENERAL NOTES APPLY TO ALL CONTROLS DRAWINGS HEREUNDER. CONTRACTOR SHALL PROVIDE PRODUCT DATA AND SHOP DRAWINGS OF SPECIFIC SYSTEM FOR APPROVAL.
- SEE FLOOR PLANS AND PIPING DIAGRAMS FOR RESPECTIVE ROOM THERMOSTAT, IMMERSION THERMOSTAT LOCATIONS. COORDINATE SENSOR LOCATIONS, PIPE TEES, AND PANEL LOCATIONS WITH OTHER DISCIPLINES. SEE ELECTRICAL DRAWINGS FOR COORDINATION.
- EQUIPMENT AND CONFIGURATION IN SCHEMATICS ARE GENERAL AND DO NOT INCLUDE ALL ITEMS SUCH AS RELAYS, TRANSFORMERS, ETC. TO ACHIEVE RESULTS INTENDED, CONTRACTOR TO PROVIDE ALL MATERIALS AND EQUIPMENT AS NECESSARY.
- THE HEATING PLANT CONTROL SYSTEM SHALL BE ELECTRONIC INTEGRATED CIRCUIT CONTROLS UTILIZING LOW VOLTAGE AND LINE VOLTAGE CIRCUITS TO CONTROL THE BOILER, ZONE CIRCULATING PUMPS, AUTOMATIC VALVES, AND ROOM THERMOSTATS OPERATIONS. PROVIDE A CONTROL SYSTEM TO ACCOMPLISH THE RESULTS INTENDED; NOT ALL EQUIPMENT AND CIRCUITS MAY BE SHOWN. CONTRACTOR IS TO REUSE THE TWO-WIRE CIRCUITRY OF THE EXISTING ROOM THERMOSTATS FOR NEW THERMOSTAT CONTROL; VERIFY ANY DEFICIENCIES. TEKMAR CONTROLS ARE THE DESIGN MANUFACTURER; OTHER MANUFACTURES ACCEPTABLE UPON APPROVAL.



HEATING PLANT CONTROL DIAGRAM
NO SCALE



FRONT OF CONTROL 403

BACK OF CONTROL 403

CONTROL SCHEMATIC - TEKMAR 403
NO SCALE

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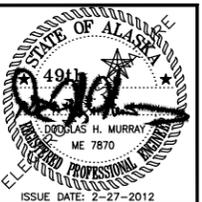
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HEATING PLANT RENOVATION
JUNEAU, ALASKA

SHEET TITLE:
CONTROLS

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M501



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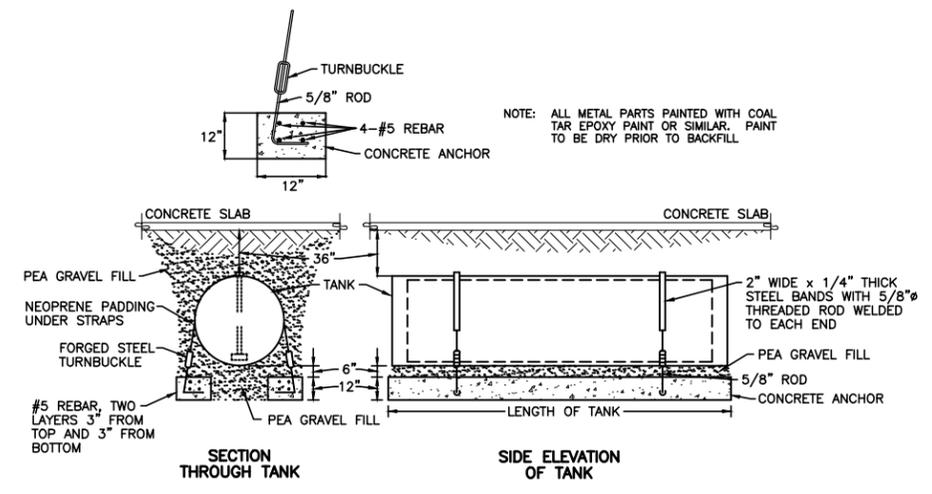
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**HAINES PUBLIC SAFETY
HEATING PLANT RENOVATION**
JUNEAU, ALASKA

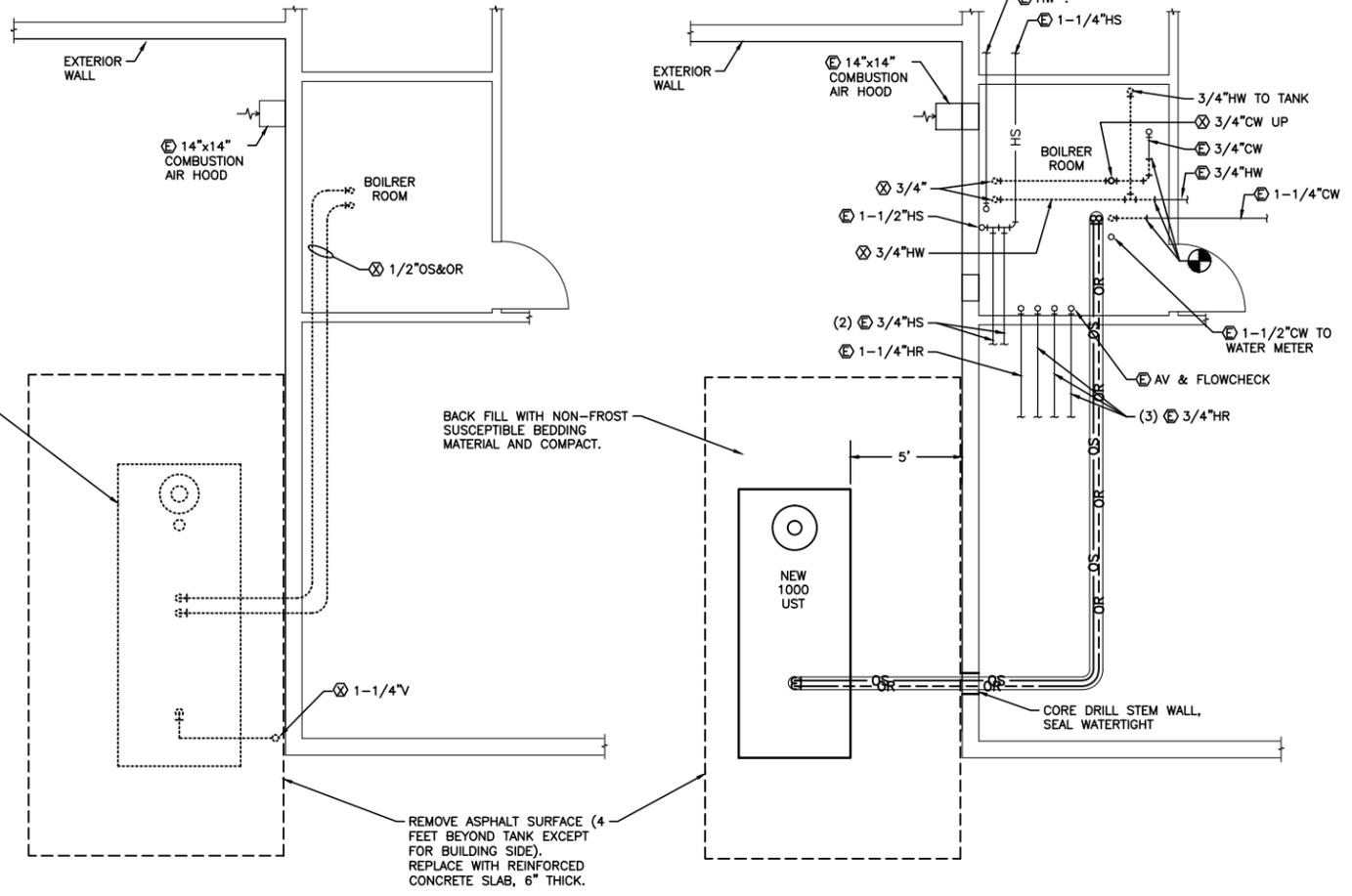
SHEET TITLE:
FUEL TANK -
ALTERNATE WORK

SCALE: AS NOTED
DATE: FEB-2011
DRAWN: KB
DESIGNED: DM
CHECKED: DM

SHEET NO.
M601

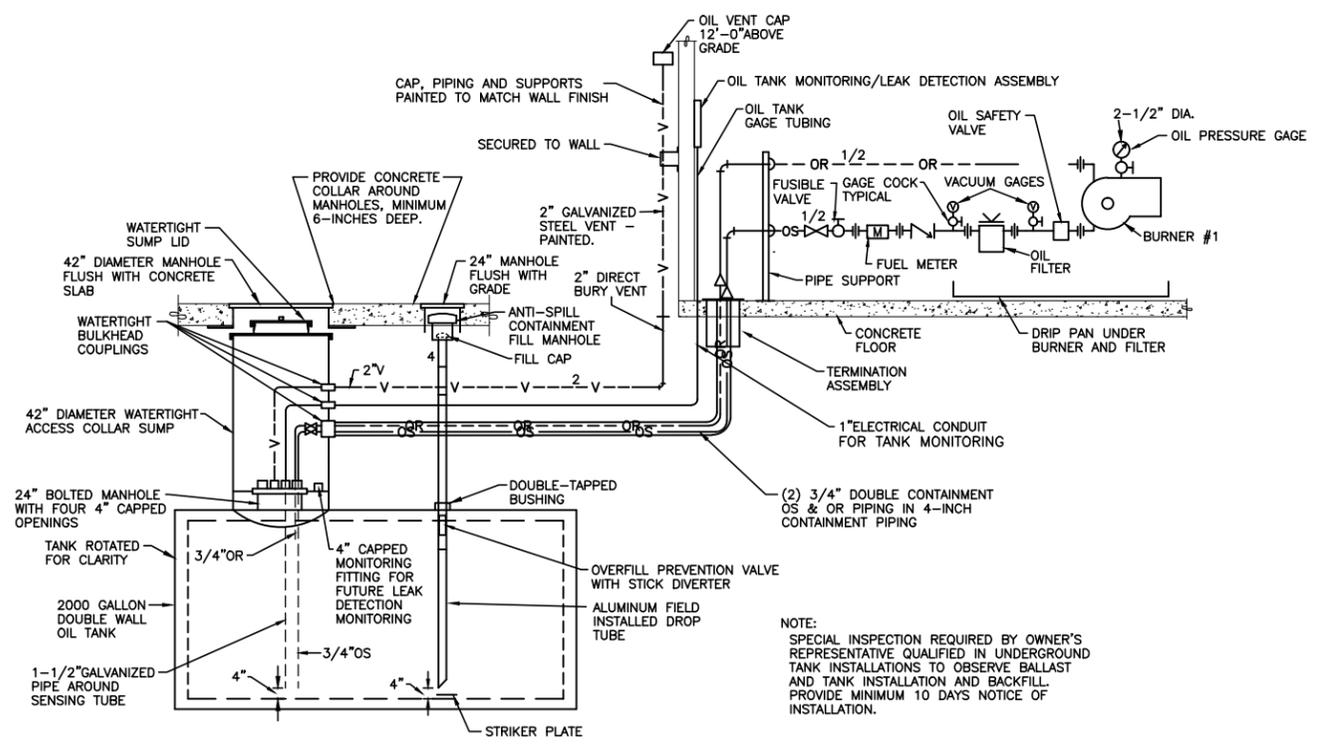


1 FUEL TANK ANCHOR DETAIL - ALTERNATE
NO SCALE



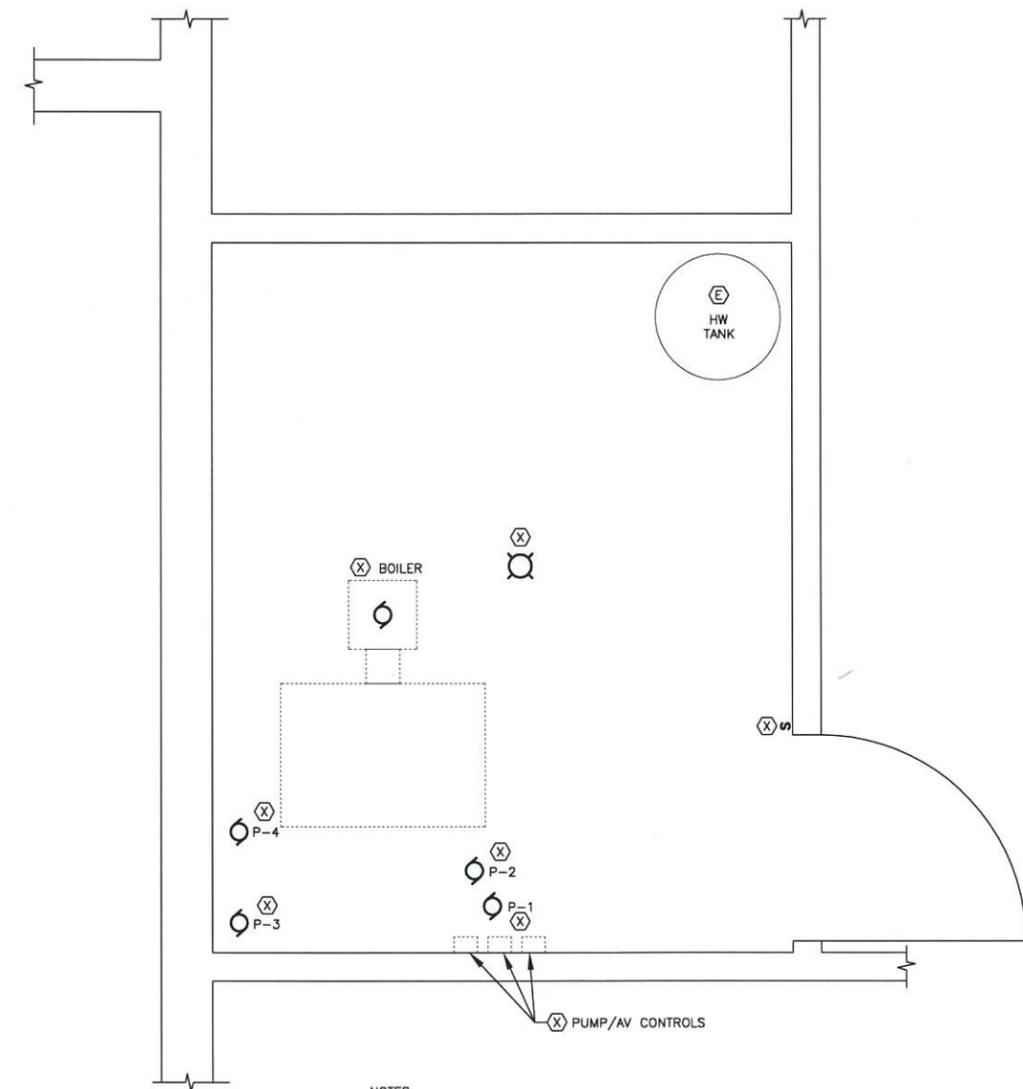
**3 PARTIAL SITE PLAN - DEMOLITION
ALTERNATE WORK**
SCALE: 0 2' 4' 8'
PROJECT NORTH

**4 PARTIAL SITE PLAN - NEW
ALTERNATE WORK**
SCALE: 0 2' 4' 8'
PROJECT NORTH



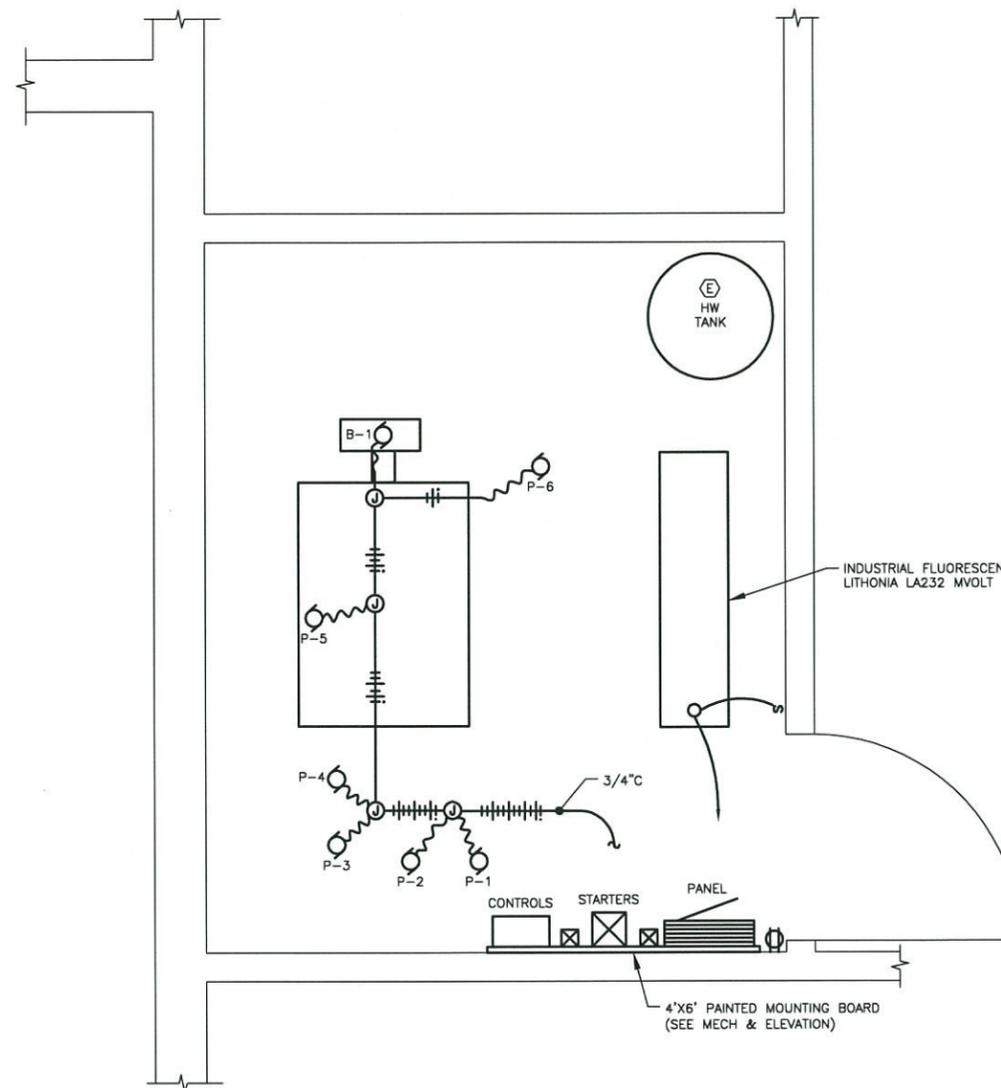
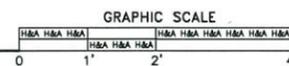
2 OIL PIPING DIAGRAM - ALTERNATE
NO SCALE

NOTE:
SPECIAL INSPECTION REQUIRED BY OWNER'S
REPRESENTATIVE QUALIFIED IN UNDERGROUND
TANK INSTALLATIONS TO OBSERVE BALLAST
AND TANK INSTALLATION AND BACKFILL.
PROVIDE MINIMUM 10 DAYS NOTICE OF
INSTALLATION.

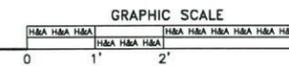


- NOTES:
1. DISCONNECT HEATING SYSTEM EQUIPMENT TO ALLOW THEIR REMOVAL.
2. REMOVE EXISTING LUMINAIRES, RECEPTACLES, AND ASSOCIATED CIRCUIT CONDUCTORS.

EXISTING BOILER ROOM PLAN



NEW BOILER ROOM PLAN



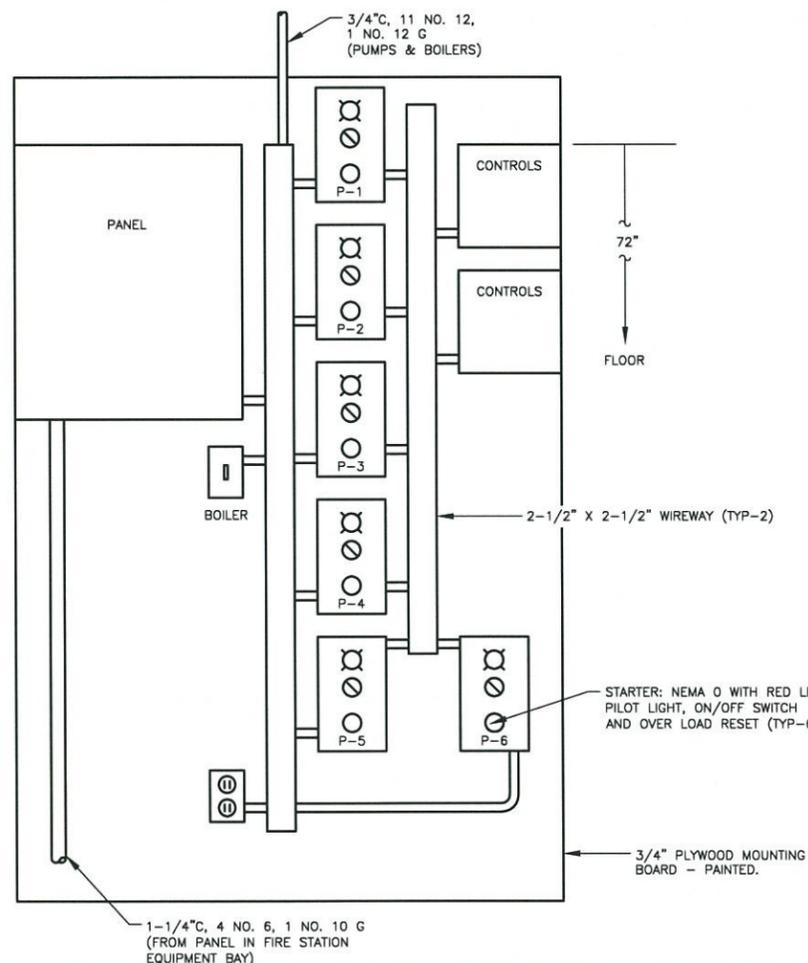
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BOILER ROOM PLAN

SCALE: AS NOTED
DATE: JAN-2012
DRAWN: REJ
DESIGNED: BCH
CHECKED: BCH

SHEET NO.
E101

JOB NO. M-451

- NOTES:
1. ALL CIRCUITS WITH SINGLE CONDUCTORS IN RACEWAY.
 2. RACEWAYS INCLUDE EMT WITH SET SCREW FITTING. FLEXIBLE STEEL CONDUIT, AND STEEL WIREWAYS WITH SCREW HELD COVERS.
 3. CONDUCTORS: THHN-THWN, STRANDED COPPER.
 4. PROVIDE NEW PANEL WITH FEEDER FROM EXISTING PANEL IN FIRE STATION EQUIPMENT BAY. ROUTE THROUGH EQUIPMENT BAY AND CRAWL SPACE. PROVIDE 60/3 CIRCUIT BREAKER IN EXISTING PANEL.
 5. RECEPTACLE: NEMA 5-20R, GRAY, SPEC GRADE.
 6. SWITCH: 20 AMP, 120-277 VOLT, SPEC GRADE.
 7. PANELBOARD: DEADFRONT WITH BOLT-IN CIRCUIT BREAKERS.



PANEL B		SIZE	VOLTS/PHASE			MAIN		LOCATION	MOUNT
		100 AMPS	208Y/120V, 3 PH			MLO		BOILER 101	SURFACE
C K T NO	DESCRIPTION	BREAKER AMP/ POLE	KVA			BREAKER AMP/ POLE	DESCRIPTION	C K T NO	
			CKT	AØ	BØ				CØ
1	LIGHTS	20/1	0.1	0.1		0.0	RECEPTACLES	2	
3			0.0		0.0	0.0		4	
5	PUMP P-1	20/1	0.1			0.2	PUMP P-5	6	
7	PUMP P-2	20/1	0.1	0.2		0.1	PUMP P-6	8	
9	PUMP P-3	20/1	0.1		0.1	0.0		10	
11	PUMP P-4	20/1	0.1			0.2	BOILER	12	
13			0.0	0.0		0.0		14	
15			0.0		0.0	0.0		16	
17	CONTROLS	20/1	0.1			0.1		18	
BALANCED CONNECTED LOAD: 0.9 KVA / 1.1 AMPS				0.3	0.1	0.5			
MAXIMUM CONNECTED LOAD: 0.9 KVA / 1.1 AMPS									

ELEVATION - POWER/CONTROLS MOUNTING BOARD



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Feb 23, 2012

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HAINES PUBLIC SAFETY
HEATING PLANT RENOVATION
JUNEAU, ALASKA

SHEET TITLE:
SPECS

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- D. Expansion Anchors: Carbon-steel wedge or sleeve type.
 - E. Toggle Bolts: All-steel springhead type.
 - F. Powder-Driven Threaded Studs: Heat-treated steel.
 - G. Electrical Equipment Installation:
 - 1. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
 - 2. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
 - 3. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
 - 4. Right of Way: Give to raceways and piping systems installed at a required slope.
 - H. Electrical Supporting Device Application:
 - 1. Dry Locations: Steel materials.
 - 2. Selection of Supports: Comply with manufacturer's written instructions.
 - 3. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.
 - L. Support Installation:
 - 1. Install support devices to securely and permanently fasten and support electrical components.
 - 2. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
 - 3. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
 - 4. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
 - 5. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
 - 6. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.
 - 7. Support sheet-metal boxes directly from the building structure or by bar hangers.
 - 8. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - a. Wood: Fasten with wood screws or screw-type nails.
 - b. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 - c. Existing Concrete: Expansion bolts.
 - d. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
- 1.2 IDENTIFICATION
- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
 - B. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
 - C. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

- D. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in white letters on black background.
- E. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- F. Installation:
 - 1. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
 - 2. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
 - 3. Self-Adhesive Identification Products: Clean surfaces before applying.
 - 4. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.

1.3 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

1.4 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

1.5 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

1.6 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.



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B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

GROUNDING

1.1 GROUNDING CONDUCTORS

- A. Material: Copper, only.
- B. Equipment Grounding Conductors: Insulated with green-colored insulation.
- C. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

1.2 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

1.3 INSTALLATION

- A. Use only copper conductors for both insulated.
- B. In raceways, use insulated equipment grounding conductors.
- C. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- D. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

CONDUCTORS AND CABLES

1.1 CONDUCTOR & CABLE MATERIAL

- A. Copper complying with NEMA WC 5 or 7; stranded for No. 8 AWG and larger.
- B. Insulation Types: Type THW, THHN-THWN, XHHW, USE, and SO complying with NEMA WC 5 or 7.

1.2 CONDUCTOR AND INSULATION APPLICATIONS

- A. Exposed Feeders: Type THW, THHN-THWN, or XHHW, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THW, THHN-THWN, or XHHW, single conductors in raceway.

- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THW, THHN-THWN, or XHHW single conductors in raceway.
- D. Exposed Branch Circuits, including in Crawlspace: Type THW, THHN-THWN, or XHHW, single conductors in raceway and Metal-clad cable, Type MC.
- E. Class 1 Control Circuits: Type THW, THHN-THWN, or XHHW single conductors in raceway.
- F. Class 2 Control Circuits: Type THW, THHN-THWN, or XHHW single conductors in raceway.
- G. Coordinate conductor insulation temperature rating and ampacity rating with the temperature and ampacity rating of their circuit protection devices.
- H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- I. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- J. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

RACEWAYS

1.1 CONDUIT AND TUBING

- A. EMT AND FITTINGS: ANSI C80.3.
 - 1. Fittings: Set-screw or compression type.
- B. FMC: Zinc-coated steel.
- C. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

1.2 WIREWAYS

- A. Sheet metal sized and shaped as indicated, NEMA 1; Screw-cover type. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

1.3 INSTALLATION

- A. Indoors:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC.
 - 4. Boxes and Enclosures: NEMA 250, Type 1.
- B. Minimum Raceway Size: 1/2-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
- D. Conceal conduit and EMT within finished and inaccessible walls, ceilings, and floors, unless otherwise indicated.
- E. Install exposed raceways, and raceways within accessible spaces, parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.



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2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

F. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

G. Tighten set screws of threadless fittings with suitable tools.

H. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

J. Flexible Connections: Use maximum of 36 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Install separate ground conductor across flexible connections.

BOXES, ENCLOSURES, AND CABINETS

1.1 Sheet Metal Outlet and Device Boxes: NEMA OS 1.

1.2 Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

1.3 Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

A. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

1.4 Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

WIRING DEVICES

1.1 RECEPTACLES

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498, 20 ampere, minimum.

1. Straight-Blade and Locking Receptacles: Heavy-Duty grade.

1.2 SWITCHES

K. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20. Heavy-Duty grade, quiet type.

1.3 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Unfinished Spaces: Galvanized steel.

1.4 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top.

ENCLOSED CONTROLLERS

1.1 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Motor-Starting Switches: "Quick-make, quick-break" toggle; marked to show whether unit is off or on.

1. Configuration: Nonreversing
2. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
3. Red pilot light

A. Magnetic Controllers: Full voltage, across the line, electrically held.

1. Configuration: Nonreversing.
2. Contactor Coils: Pressure-encapsulated type.
3. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
4. Solid-State Overload Relay:

- a. Switch or dial selectable for motor running overload protection.
- b. Sensors in each phase.
- c. Class 10 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.

5. N.O., isolated overload alarm contact.

1.2 ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location. NEMA Type 1.

1.3 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty type.

- a. Push Buttons: Shielded types; momentary.
- b. Pilot Lights: LED types; colors as indicated.
- c. Selector Switches: Rotary type.

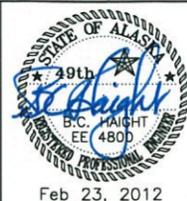
1.4 INSTALLATION

A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall.

B. Comply with NECA 1.

C. Identification: Identify enclosed controllers, components, and control wiring:

1. Label each enclosure with engraved nameplate.
2. Label each enclosure-mounted control and pilot device.



- D. Control Wiring Installation: Connect selector switches and other automatic-control selection devices where applicable. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

PANELBOARDS

1.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, [Type 1]
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel
 - 4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- B. Phase, Neutral, and Ground Buses:
 - 5. Material: Tin-plated aluminum.
 - 6. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- C. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 7. Material: Tin-plated aluminum.
 - 8. Main and Neutral Lugs: Mechanical type.
 - 9. Ground Lugs and Bus-Configured Terminators: Mechanical type.
- D. NEMA PB 1, lighting and appliance branch-circuit type.
- E. Branch Overcurrent Protective Devices: [Plug-in] [Bolt-on] circuit breakers, replaceable without disturbing adjacent units.

1.2 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.
- B. Mount top of trim 78 inches above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Install overcurrent protective devices not already factory installed.
- E. Install filler plates in unused spaces.
- F. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

LIGHTING

- 1.1 Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- 1.2 INSTALLATION
 - A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

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