

Invitation to Bid

Project: Kenai Vintage Point Housing Boiler & Controls Replacement

Release: August 2, 2023

Pre-Bid Meeting / Site Visit: August 9, 2023 2:00pm

Last day for Questions: August 16, 2023 by 10:00am

Bids Due Date: August 23, 2023, no later than 10:00am

Kenai City Hall

210 Fidalgo Avenue

Kenai, AK 99611

ATTN: Director of Public Works

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Appendix A – Plans & Specifications

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Advertisement for Bid

Project Name: Kenai Vintage Point Housing Boiler & Controls Replacement

Release: August 2, 2023

Pre-Bid Meeting: August 9, 2023 at 2:00pm at site; 361 Senior Ct. Kenai, AK 99611

Last Day for Questions: No later than 10:00am August 16, 2023

Bid Due Date and Time: No later than 10:00am August 23, 2023 at City Hall

Scope of Work: This project, located with the Vintage Point Senior Housing Facility, will replace an aging cast iron boiler and circulation pumps with new high efficiency condensing boilers and variable speed pumps. New backup power generation equipment will also be included with this work. Contractors shall download the available plans and specifications for a full description of requirements.

Bidders should contact the Public Works Department at (907) 283-8236 to be placed on the plans holders list. Questions may be submitted to publicworks@kenai.city.

Bids must be delivered in a sealed envelope clearly marked with the project name to the Public Works Department at the address above or emailed electronically to scurtin@kenai.city Bid documents can be obtained on the City of Kenai website at www.kenai.city or at City Hall for a non-refundable fee of \$30.00 including sales tax for each set of documents.

This contract will be subject to the provisions of the State of Alaska Title 36 Wage and Hour Administration Pamphlet Statutes and Regulations and will require 100% performance and payment bonds.

Publish: Anchorage Daily News – August 2, 2023 or 1st date after

Peninsula Clarion – August 2, 2023 or 1st date after

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CITY OF KENAI INSTRUCTIONS TO BIDDER

1. GENERAL

These instructions specify the form and procedures for the submission of a complete and acceptable bid. To obtain addenda in a timely manner, you should be on the City of Kenai's plan holder's list. Downloading project specifications and drawings from the City website or other online plans rooms does not place you on the City's plan holder's list. To be added to the plan holder's list, please contact the Public Works Department Administrative Assistant by phone (907) 283-8236 or by email at PublicWorks@kenai.city.

Project: Kenai Vintage Point Housing Boiler & Controls Replacement

Release: August 2, 2023

Pre-Bid Meeting / Site Visit: August 9, 2023 at 2:00pm at the site's boiler room

Last Day for Questions: August 16, 2023 by 10:00am

Bids Due Date and Time: August 23, 2023 by 10:00am at City Hall

2. EVIDENCE OF QUALIFICATIONS

Upon request of the City, a Bidder whose bid is under consideration for the award of the Agreement, shall submit promptly to the City, satisfactory evidence of the Bidder's financial resources, their experience, their performance in completing other projects of a similar nature, and the organization and equipment they have available for the performance of the Agreement.

3. BIDDER QUALIFICATIONS

Before the bid is considered for award, the City reserves the right to determine whether or not a Bidder is responsible and to require the Bidder to complete a Bidder Qualification Form and/or provide a current financial statement prepared by a Certified Public Accountant. The City shall determine whether a Bidder is responsible on the basis of the following criteria:

- The skill and experience demonstrated by the Bidder in performing Agreements of a similar nature.
- The Bidder's record for honesty and integrity.
- The Bidder's capacity to perform in terms of facilities, personnel, and financing.
- The Bidder's past performance under City Agreements. If the Bidder has failed in any material way to perform its obligations under any Agreement with the City, the Bidder may be determined as a non-responsible Bidder.
- A Bidder's representations concerning their qualifications will be construed as a covenant under the Agreement. Should it appear that the Bidder has made a material misrepresentation, the City shall have the right to terminate the Agreement for the Contractor's breach, and the City may then pursue such remedies as provided in the Agreement Documents or as provided by state statute, City code, or as appropriate.

Any final determination that a Bidder is non-responsible will be made by the City Manager. Such determination will be made in writing to the Bidder setting forth the reasons for such determination.

4. CONDITIONS AFFECTING THE WORK

The Bidder shall examine carefully the site(s) of the proposed work and the bid documents before submitting a bid. The submission of a bid shall be an admission that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements and accuracy of the bid documents.

The City assumes no responsibility for any understanding or representations concerning conditions made by any of its officers, agents, or employees prior to the execution of this Agreement, unless such understanding or representations are expressly stated in the bid documents or Addenda.

The Bidder shall include in their bid, sufficient sums to cover all items required by the Agreement and the conditions of the site(s), and shall rely entirely upon their own examination in making their bid. The submission of a bid shall be taken as prima facie evidence of compliance with this paragraph.

If information or documentation required for submitting an accurate and complete bid is absent from these documents, the Bidder is required to notify the Public Works Director by facsimile (907) 283-3014, or by e-mail to PublicWorks@kenai.city.

5. SECURITY TO BE FURNISHED BY BIDDER

If the bid exceeds \$100,000, a certified check, bank cashier's check, or bid bond, made payable to the City of Kenai amount equal to five (5%) percent of the total bid, shall accompany each bid as evidence of good faith, a guarantee that if awarded the agreement, the Bidder will execute the agreement and give bond as required. All Bidder's checks or bid bonds will be retained until the successful Bidder has entered into a satisfactory agreement and furnished bonds, as required. The successful Bidder shall furnish the City a Performance and Payment bond in the full amount of the Agreement and shall maintain the Bond in force during the continuance of the Agreement. The bonds must be furnished prior to the City's execution of the Agreement. The Bond shall be for the faithful performance of the Agreement in all respects including, but not limited to, payments for all materials and labor. All alterations, extensions of time, additional work, and other changes authorized by the Agreement Documents may be made without securing the consent of the Surety or Sureties. Power-of-Attorney for the person signing the Bond for the Surety must be submitted with the Bond. These bonds, in whatever amount required by the specific agreement, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25, and shall comply with all requirements for payment and submission of claims as provided by that chapter.

6. LICENSING

Alaska State Statutes requires that all businesses wishing to engage in business in Alaska obtain license(s). All Bidders are required to furnish with their bid, the applicable, current licenses required to perform the work. Applicable licenses may include the following: Contractor's License, Specialty Contractor License, and Alaska Business License. Failure to submit license(s) with the bid may result in rejection of the Contractor's bid.

7. TAX COMPLIANCE CERTIFICATE

No agreement will be awarded to any individual or entity that is in violation of the tax laws of the City of Kenai or the Kenai Peninsula Borough unless the violation is cured within ten business days of notice. The Tax Compliance Certificate must be signed by the Bidder only and submitted with the bid. The City will obtain verification of tax compliance from the Kenai Peninsula Borough for the successful bidder. Bids submitted without a completed Tax Compliance Certificate may be considered non-responsive.

8. INTERPRETATION OR CORRECTIONS OF BID DOCUMENTS

Bidders shall notify the Public Works Director promptly of any error, omission, or inconsistency that may be discovered during examination of the bid documents and the proposed work site(s). Requests from Bidders for interpretation or clarification of the bid documents shall be made in writing to the Public Works Director and shall arrive no later than the time and date specified in Section 1 of these Instructions to Bidders. Questions may be faxed to (907) 283-3014 or emailed to PublicWorks@kenai.city. The subject line of the email or fax must include the name of the project.

Oral questions may be presented at a pre-bid conference if one is provided for in Section 1 of these Instructions to Bidders. Interpretations, corrections, or changes, if any, to the bid documents shall be made by Addendum. Bidders shall not rely upon interpretations, corrections, and changes made in any other manner, including orally, at the pre-bid conference. Interpretations, corrections, and changes shall not be binding unless included in an Addendum. All Addenda issued during the time of bidding shall become part of the Agreement Documents. Questions or requests for clarifications shall be directed to the Public Works Director. Only written interpretations or corrections by Addendum shall be binding, and no other forms of interpretation or correction will be binding on the City of Kenai.

It is the Bidder's sole responsibility to ascertain that they have received all Addenda issued by the City of Kenai. Addenda will be issued electronically and/or by facsimile. All Addenda must be acknowledged in the space provided on the Bid Form. If no Addenda have been issued, write or type "zero" or "N/A" on the Bid Form in the space provided.

9. PREPARATION AND SUBMISSION OF BIDS

- Bids must be received at City Hall prior to the time and date specified in Section 1 of these Instructions to Bidders.
- Bids must be submitted on the Bid Form furnished. Bids must be completed in ink or by typewriter, and must be manually signed by an authorized person. If erasures or other changes appear on the forms, the person signing the bid must initial each erasure or change in ink.
- Bids shall specify a unit or lump sum price, typed or written in ink in figures, for each bid item called for. In case of error in the extension of prices, the unit price will govern. Bids may be rejected if they show any omissions, alteration of the forms, additions not called for, conditional or alternate bids not called for, qualified bids, or irregularities of any kind.

- It is expressly agreed that the quantities shown in the Bid Form, whether for a "Unit Price Bid" or in connection with a "Lump Sum Bid" on the Bid Form are approximate only for use as a basis for comparison of bids and are not to be taken to be either representations or warranties. The City does not expressly, nor by implication, agree that the actual amount of work will correspond therewith.
- The Bid Form invites bids on definite plans and specifications. Only the amounts and information asked for on the Bid Form will be considered as the bid. Each Bidder shall bid upon the work exactly as specified and as requested on the Bid Form, and Bidders shall bid upon all alternates as indicated. When bidding on an alternate for which there is no charge, Bidder shall write the words "No Charge" in the space provided.
- One (1) complete bid package shall be completely sealed in an envelope clearly marked with the Bidder's company name, and the "Project Name" and "Bid Due Date" specified in Section 1 of these Instructions to Bidders. A complete bid package shall include the following documents:
 - o Bid Form
 - Tax Compliance Certificate
 - Applicable Licenses
 - Non-Collusion Affidavit
 - Bid Bond with Power of Attorney (If bid exceeds \$100,000.00)
- Bids received without all the required documents may be considered non-responsive.
 Bids received after the bid due date and time will be considered non-responsive and will not be accepted.
- No responsibility shall be attached to the City for the premature opening of, or the failure to open a bid not properly addressed and identified.
- Please note that overnight delivery from the Lower 48 States is generally not available.
 Prospective Bidders should anticipate a minimum of two to three days delivery time for express, priority or expedited delivery services.

10. MODIFICATION OF BIDS

Bid modifications will be accepted by the City at publicworks@kenai.city and binding upon the Bidder where the modification:

- is received at City Hall prior to the time and date specified in Section 1 of these Instructions to Bidders.
- does <u>not</u> identify the adjusted Bid Total price. Only adjustments to the sealed bid will be accepted. For example:
 - CORRECT Decrease the Unit Bid Price of Item 20.22 Leveling Course by \$2.50 per ton and the Bid Total by \$2,500.
 - CORRECT Increase the Unit Bid Price of Item 90.16 Mobilization and Demobilization and the Bid Total by \$5,000.
 - INCORRECT Decrease the Bid Total by \$5,000 for a new Total of \$95,000.
- is signed by the same individual who signed the original bid.

Should there be more than one bid modification from a Bidder, only the last modification received prior to the deadline shall be applied to the bid. All earlier modifications shall be disregarded.

Any modification which fails to meet any requirement of this section shall be rejected, and the bid shall be considered as if no modification had been attempted.

It is the Bidder's responsibility to confirm the City's receipt of any bid modification.

11. WITHDRAWAL OF BID

At any time prior to scheduled closing time for receipt of bids, any Bidder may withdraw their bid, either personally or by written request.

After the scheduled closing time for receipt of bids, no Bidder will be permitted to withdraw their bid unless Notice of Award is delayed for a period exceeding forty-five (45) days.

A bid may not be withdrawn after opening without the written consent of the City.

12. ACCEPTANCE - REJECTION OF BIDS

The City reserves the right to reject any or all bids, to waive minor irregularities in any bids or in the bidding procedure, and to accept any bid presented which meets or exceeds said specifications and which is deemed to be in the best interest of the City. However, the requirements for timeliness and manual signatures shall not be waived. The City is not obligated to accept the lowest bid and is not responsible for bid preparation costs.

13. EXECUTION OF AGREEMENTS

The successful Bidder shall be required to execute an Agreement for the work within ten (10) days after receiving the Notice of Award and Agreement documents from City; if Contractor does not return executed copies within this time, then, at the option of City, the bid may be rejected.

14. AWARD OF AGREEMENT

It is the intent of the City to award the bid to the lowest, qualified, responsive and responsible Bidder. Unless otherwise stated in the bid documents, the Agreement, if awarded, shall be awarded to the responsible Bidder who submits the lowest responsive bid. When bid documents contain a base bid and alternates, only the total of the base bid and the alternates to be awarded shall be used to determine the low Bidder.

The amount of the Agreement shall be the total sum of the amounts computed from the estimated quantities and unit prices and/or the lump sum awarded by the City and specified in the Agreement.

On all bids, Notice of Award or rejection will be given within forty-five (45) days of bid opening. The notice will be in writing and signed by the Public Works Director. A Notice of Intent to Award, and no other act of the City of Kenai or its representatives, constitutes an acceptance of a bid. The acceptance of a bid shall bind the successful Bidder to execute the Agreement.

15. AGREEMENT AND PERFORMANCE AND PAYMENT BOND SIGNATURE INSTRUCTIONS WHEN BONDS ARE REQUIRED

The successful Bidder shall insert the full name and business of the Contractor in the Agreement and on the Performance and Payment Bond, hereinafter the Bond.

If the Contractor is a partnership or joint venture, all partners or joint ventures shall sign the Agreement and the Bond except that one partner or one joint venturer may sign for the partnership or joint venture when all other partners or joint venturers have executed a Power-of-Attorney authorizing one partner or joint venturer to sign. The Power-of-Attorney shall accompany the executed Agreement and the Bond.

If the Contractor is a Limited Liability Company (LLC), a person with appropriate authority to bind the LLC shall execute the Agreement and Bond unless a Power-of-Attorney or Corporate Resolution accompanies the executed Agreement and Bond.

If the Contractor is a corporation, the President or Vice-President and Secretary or Treasurer of the corporation shall execute the Agreement and the Bond unless a Power-of-Attorney or Corporate Resolution accompanies the executed Agreement and Bond.

The Bond shall be returned undated as to Agreement Date. The Agreement Date shall be inserted on the Agreement when the City signs the Agreement and the Bond shall be dated the same as the Agreement Date.

16. SPECIAL PROVISIONS

If funded in part or in whole by a grant or grants, the contractor and their subcontractors will be required to comply with the requirements of these grants, including insurance and purchasing requirements, if any. If any permits are included with the bid documents, e.g. a U.S Corp of Engineers wetland permit, all conditions of this permit must be met by the Contractor and their Subcontractors.

17. APPEAL PROCEDURE

KMC 7.15.120 Appeal procedures.

- (a) Any party submitting a bid or proposal for a contract with the City and who believes that they are adversely affected by the City's relevant ordinances, regulations, procurement process, or by any acts of the City in connection with the award of a City contract, may file a protest appeal with the City Clerk. All protest appeals must be to the City within five (5) calendar days of the issuance of the City's notice of its intent to award the contract. The appeal must be hand delivered, delivered by mail, or by facsimile and must comply with all requirements of this section. If the fifth day is a City-recognized holiday or a weekend, the deadline for appeal shall be the next work day. It is up to the protester to choose a method of delivery to assure timely receipt by the City.
- (b) Rejection of Appeal. The Clerk shall reject an untimely or incomplete appeals. Such rejection shall be final and may be appealed to the Superior Court pursuant to the Court Rules of Appellate Procedure.
- (c) The protest appeal must be in writing and shall include the following information:
- (1) The name, address, e-mail, and telephone (and facsimile if available) numbers of the protester;
- (2) The signature of the protester or the protester's representative;
- (3) Identification of the contracting agency and the solicitation or contract at issue;

- (4) A statement of the legal and factual grounds of the protest, including copies of relevant documents; and
- (5) The form of relief requested.
- (d) Stay of Award. If a timely and complete protest appeal is filed, the award of the contract shall be stayed until all administrative remedies have been exhausted, unless the City Manager determines in writing that award of the contract pending resolution of the appeal is in the best interests of the City.
- (e) Notice and Response. Notice of the stay and protest appeal shall be delivered to any party who may be adversely affected by the City Manager's decision by facsimile, first class mail or in person within three (3) business days of receipt of a properly filed appeal.
- (f) City Manager Decision. The City Manager shall issue a written decision to the appellant within ten (10) business days of the date the appeal is filed. If multiple appeals have been filed, they may be consolidated for purposes of the decision. Copies of the appeal and decision shall be provided to any interested party requesting one. The decision may include any lawful action, including without limitation an amendment of all or any part of the recommended award. For good cause shown, the City Manager may extend the date for the decision for such additional period as may be necessary.
- (g) If the City Manager sustains a protest in whole or in part, the City Manager shall implement an appropriate remedy. In determining an appropriate remedy, the City Manager shall consider the circumstances surrounding the solicitation or procurement including the seriousness of the procurement deficiencies, the degree of prejudice to other interested parties or to the integrity of the procurement system, the good faith of the parties, the extent the procurement has been accomplished, costs to the agency and other impacts on the agency of a proposed remedy, and the urgency of the procurement to the welfare of the City.
- (h) Notwithstanding subsections (a) and (b) immediately above, if the City Manager sustains a bid protest appeal in whole or part, the protester's damages shall not exceed the reasonable bid or proposal preparation costs.
- (i) Appeal to Superior Court. Appeals may be taken from the written decision of the City Manager within thirty (30) days of the date of the decision pursuant to Part VI of the Alaska Rules of Appellate Procedure. (Ord. 2852-2015)

18. COMPLIANCE OR ACCEPTED ALTERNATES TO SPECIFICATIONS

Bidder hereby agrees that the material offered will meet all the requirements of the specifications in this solicitation unless alternates have been deemed acceptable by the City. Manufacturer's names, trade names, brand names, model and catalog numbers used in these specifications are for the purpose of describing and establishing general quality levels. Such references are not intended to be restrictive. Alternates will be approved via addenda, and only via addenda. Request for alternates must be submitted no later than the Last Day for Questions in the Advertisement for Bid. An alternate must be requested via email sent to the addresses in section 1 with an explanation giving in detail the extent of the alternate, the reason for which it is requested, and why the City should approve the alternate. Provide as much detail as possible. If multiple models or options are provided with your submittal data clearly indicate which you are requesting. The City of Kenai will be the sole judge of whether an alternative is acceptable to the items specified.

19. Insurance Requirements

Please see Section 7.2 of the General Conditions for full detail of Insurance Requirements. Contractor will be required to provide an Insurance Certificate at time of contract in compliance of the requirements.

CITY OF KENAI BID FORM

TO: City of Kenai

Public Works Department 210 Fidalgo Avenue Kenai, Alaska 99611-7794

FROM:

Name of Bidder's Company or Business Entity

BIDDER'S DECLARATION & UNDERSTANDING

The undersigned, hereinafter called the Bidder, declares that the Bidder has carefully examined the Bid Documents including but not limited to: the Agreement, Addenda, Supplemental General Conditions, General Conditions, Drawings and Specifications, Invitation to Bid, Instructions to Bidders, this Bid Form, Advertisement, Releases, Affidavits, and supplemental documentation (e.g. Grant documentation, Title 36 or other State Statues), and the location(s) where work is to be performed for the project, and that the Bidder has satisfied themselves as to the contractual requirements, and quantity and condition of work involved.

It is expressly agreed that the quantities shown in the Bid Form, whether for a "Unit Price Bid" or in connection with a "Lump Sum Bid" on the Bid Form are approximate only for use as a basis for comparison of Bids and are not to be taken to be either representations or warranties. The City does not expressly, nor by implication, agree that the actual amount of work will correspond therewith.

The Bidder further declares that the only person or parties interested in the Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the City of Kenai, and that the Bid is made without any connection or collusion with any person submitting another Bid.

The Bidder agrees not to withdraw this bid within forty-five (45) days after the actual date of the bid opening.

DOCUMENTS TO SUBMIT WITH THIS BID

- 1. Bid Form
- 2. Tax Compliance Certificate
- 3. Applicable Licenses
- 4. Non-Collusion Affidavit
- 5. Bid Bond with Power-of-Attorney (If Bid exceeds \$100,000.00)

DOCUMENTS THE CITY OF KENAI IS TO RECEIVE WITHIN 10 DAYS AFTER NOTICE OF AWARD

The Bidder agrees that if this Bid is accepted he will deliver to the City of Kenai, within ten (10) calendar days of Notice of Award, the following:

- 1. Executed Agreement
- Certificate(s) of Insurances*
- 3. Construction Schedule
- 4. List of Subcontractors
- Performance and Payment Bond

Kenai Vintage Point Housing Boiler & Controls Replacement

6. Power of Attorney and/or Corporate Resolution (See Instructions to Bidders)

TIME OF COMPLETION AND LIQUIDATED DAMAGES

Bidder agrees to commence and complete work as follows: Owner anticipates a Notice to Proceed on or before September 12, 2023 with Substantial Completion within 240 Calendar days from NTP.

<u>Liquidated Damages</u>. Liquidated damages will be charged at Three Hundred (\$300.00) for each calendar day that expires after the contract time required for substantial completion to the actual date of substantial completion as provided for in the Agreement Documents.

BID TABULATION AND SUMMARY

Bidder agrees to perform all of the work described and per the conditions in the Bid Documents for the prices stated on this Bid Form.

Prices are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern. In case of error in the extension of prices, the unit price will govern. Bidder understands that the City reserves the right to reject any or all bids and to waive irregularities in the bidding.

BID GUARANTEE: The Undersigned further agrees that the check or bid bond accompanying the bid is left in escrow with the City, that the amount of the check or bond is the measure of damages which the City will sustain by failure of the Undersigned to deliver said documents within ten (10) days after written notice of the award of contract to him or her, and that check shall become the property of the City, or the bid bond shall remain in full effect, should he or she so fail. But if this bid is not accepted within ninety (90) days of the date set for the opening thereof, or if accepted and the Undersigned delivers said Agreement, and performance, and labor, and material payment bonds as required, the check shall be returned to him or her and the bid bond shall become void.

EXECUTION OF BID

Bidder shall complete and submit all pages of the Bid Form.

I have received the Bid Documents for the Project: Replacement	: Kenai Vintage Point Housing Boiler & Controls
I have received Addenda No(s).	and have included their provisions in my proposal.
I have examined both the Bid Documents and the understanding that I agree:	work locations, and submit the following bid with the

- 1. To hold my bid open forty-five (45) consecutive calendar days.
- 2. To accept the provisions of the Bid Documents.
- 3. To enter into and execute an Agreement, if awarded, on the basis of my Bid.
- 4. To furnish all labor and materials and to accomplish the work in accordance with the Bid Documents.
- 5. To accomplish Substantial Completion as specified above in TIME OF COMPLETION.

^{*} Refer to the General Conditions for insurance requirements. Note the additional insured and waiver of subrogation requirements.

BASE BID TOTAL: (All work as detailed within b	id documents except for the alternates indicated below)
\$	
ADDITIVE ALTERNATE 1: (All work as detailed	within the bid documents for Add. Alt 1)
<u>\$</u>	
COMBINED BID TOTAL: (All work as detailed w	vithin the bid documents for Base Bid and Add Alt 1)
\$	
In the event the Base Bid meets the Owner's bud any combination of Base Bid and Additive Alterna	dget for the Work, Owner reserves the right to award to ate that provides the best value to the City.
	shall exist under the Agreement until the final Agreement commence work immediately upon full execution of the ice to Proceed.
If provided a Notice of Award, Bidder agrees to with the Bid Documents.	o execute and perform the Agreement in accordance
By executing this Bid I certify that I have a submitting this bid.	authority to bind the Company or Business Entity
Name of Company or Business Entity	Date
Signature	Title
Print Name	Phone
Address	Fax
Address	Email address

Tax Compliance Certification Kenai Peninsula Borough Finance Department

144 N. Binkley Street

Phone: (907) 714-2197

Soldofna, Alaska 99669-/599 www.kpb.us		or: (907) 714-217 Fax: (907) 714-237	
1.) Fill in all information requested.	2.) Sign and date. 3.) Submit v	vith solicitation, or oth	er. For Official Use Only
Reason for Certificate:		For Department	:
☐ Solicitation ☐ Other:		Dept. Contact:	
Business Name:			·
Business Type:	☐ Individual ☐ Corpora	ıtion 🗌 Partnershi	p Other:
Owner Name(s):			
Business Mailing Address:			
Business Telephone:		Business Fax:	
Email:			
contracting to do business with th	la Borough Code of Ordinan ne Kenai Peninsula Borough b	nces, Chapter 5.28.14 be in compliance with	elow. If no, please sign below.) 0, requires that businesses/individuals 1 Borough tax provisions. No contract Borough Code of Ordinances in the
REAL/PERSONAL/BUSINESS PROF	PERTY ACCOUNTS	TAX ACCOUNTS	S/STATUS (TO BE COMPLETED BY KPB)
ACCT. NO.	ACCT. NAME	YEAR LAST PAID	BALANCE DUE
			In Commission of Makin Commission
KPB Finance Department (signature	required)	Date	In Compliance 🗌 Not in Compliance
SALES TAX ACCOU	NTS	TAX ACCOUNTS	/STATUS (TO BE COMPLETED BY KPB)
	ACCT. NAME	FILED THRU	M/F'S BALANCE DUE
			In Compliance 🔲 Not in Compliance
KPB Sales Tax Division (signature rec	ųuired)	Date	
CERTIFICATION: I,(Name o	the		, hereby certify that, to the
(Name o best of my knowledge, the above i		(Title) (Date)	

Signature of Applicant (Required)

NON - COLLUSION AFFIDAVIT

(To be executed and	d submitted with Bid Proposal)
I,	of ,
	of, Firm Name
being duly sworn, do depose and state	:
	of which I am a member, who bid on the Contraction construction of that certain construction project
Kenai Vintage Point Hous	sing Boiler & Controls Replacement
	of Alaska, have not, either directly or indirectly, ed in any collusion, or otherwise taken any action n connection with such Contract.
	Signature
	Name
	Title
	Date
ACKNOWL	EDGMENT
STATE OF ALASKA	
THIRD JUDICIAL DISTRICT)	
The foregoing instrument was acknowle 2023, by	edged before me this day of
	NOTARY PUBLIC for State of Alaska My Commission Expires:

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,
as Principal, and
as Surety, are hereby held and firmly bound unto
as the OWNER, in the penal sum of
Signed thisday of, 2023. The Principal has submitted to
, a certain BID, attached hereto and hereby made a part
hereof, to enter into a contract in writing for the
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 attached hereto (properly completed in accordance with said BID), and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials 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 the liability of the Surety for 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 agree that the obligations of said Surety and its BOND shall be in no way impaired or affected by any 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, the day and year first set forth above.
Principal L.S.)
Surety
By:
IMPORTANT Surety companies executing BONDS must appear on the Treasury

business in the state where the project is located.

Bid Bond

Department's most current list (Circular 570 as amended) and be authorized to transact

Rev 2023-01-16

CITY OF KENAI AGREEMENT BETWEEN OWNER AND CONTRACTOR

MADE AS OF THE	DAY OF	2023.	
BETWEEN the OWNER	210 Fida	KENAI Igo Avenue laska 99611-7794	
AND the CONTRACTOR	₹:		
FOR the PROJECT: Ke	enai Vintage Point H	ousing Boiler & Contro	ols Replacement
The Owner and Contract	tor agree as set forth	below.	
		TICLE 1 WORK	

The Contractor shall perform all the work required by the contract documents.

ARTICLE 2 ENUMERATION OF THE CONTRACT DOCUMENTS

The additional documents which are specifically incorporated into this Agreement by reference and which form the contract documents are:

- A. Any and all later modifications, change orders, and written interpretations of the contract documents issued by the Owner
- B. This Agreement
- C. Addenda
- D. Supplemental General Conditions (if any)
- E. General Conditions
- F. Drawings and Specifications Provided by Engineer. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided.
- G. Drawings and Specifications in the latest edition of the Municipality of Anchorage Standard Specifications (M.A.S.S.) In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided. Contractor is responsible for obtaining the latest edition of the M.A.S.S
- H. The Request for Proposals / Invitation to Bid
- I. The Contractor's bid/proposal.

Any other attachments to this Agreement do not form a part of the Agreement but are for reference or proof of compliance with the requirements of the Agreement, except where the provisions of this Agreement provide such attachments will be or are a part of the Agreement.

These form the contract and what is required by any of the documents shall be as binding as if required by all. The intention of the contract documents is to require the furnishing of all labor, material, equipment, and other items necessary for the proper execution and completion of the work and to prescribe the terms and conditions of the contract and payment, so as to include work and materials which may be necessary to produce the intended results.

* M.A.S.S. is the Municipality of Anchorage Standard Specifications, and Divisions 20 through 80 are hereby incorporated into these Contract Documents. Division 10 is specifically excluded. The Contractor is responsible for checking to ensure they have the most current version. Specifications, drawings, and general provisions provided by the Owner (City of Kenai) or their Agents (Engineers, Architects, or others as appointed by the City) take precedence over the M.A.S.S.

ARTICLE 3 TIME OF COMMENCEMENT AND COMPLETION

Work shall commence upon receipt of the Notice to Proceed. All work must be substantially completed within <u>240</u> days after the date of the Notice to Proceed. Liquidated damages will be charged against the Contractor as provided below.

ARTICLE 4 CONTRACT SUM

The Owner shall pay the Contractor as provided in this contract the total sum price of \$_____ for the successful completion of the specified work.

ARTICLE 5 PROGRESS PAYMENT

Progress payments shall be made per the General Conditions.

ARTICLE 6 FINAL PAYMENT

Final payment shall be made per the General Conditions. The Contractor shall request the final inspection at least five (5) days in advance of the anticipated date of inspection. If all work has not been satisfactorily completed, the Contractor shall be liable for all costs incurred by the Owner in making such inspection.

ARTICLE 7 NOTICES

All legal notices relating to this contract, including changes of address, shall be mailed to the Owner and the Contractor at the following addresses:

CONTRACTOR

OWNER
CITY OF KENAI
Public Works Director
210 Fidalgo Avenue
Kenai, AK 99611

ARTICLE 8 INDEMNIFICATION

No provision in the contract documents lessens, alters, or makes inapplicable the requirement for indemnification stated in the General Conditions or other documents incorporated into the contract by this Agreement.

ARTICLE 9 JURISDICTION: CHOICE OF LAW

This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.

ARTICLE 10 ATTACHMENTS

In the event there is any difference between an attachment to the original of this Agreement on file with the City of Kenai Public Works Department and any attachment to a copy of the Agreement, the attachments to the original filed with the Public Works Department shall control.

ARTICLE 11 LIQUIDATED DAMAGES

Owner and Contractor recognize that time is of the essence in performance of this contract and the Owner will suffer financial loss if the work is not substantially complete within the time specified above, plus any extensions thereof allowed in accordance with contract documents. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the work is not substantially complete on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner <a href="https://documents.org/linearing-the-the-contract-time-required-for-substantial-completion-to-the-actual-date-of-substantial-completion-determined-as-set-out-in-the-Contract Documents. The Owner and Contractor agree that this amount is a reasonable forecast of just compensation for the harm that is caused by the delay.

ARTICLE 12 NO THIRD-PARTY BENEFICIARY

This Agreement is intended solely for the benefit of each party hereto. Nothing contained herein shall be construed or deemed to confer any benefit or right upon any third party.

OWNER and CONTRACTOR each binds themselves, their partners, successors, assigns and legal representatives in respect to all covenants, Agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed in their respective names or by their duly authorized representatives as of the date and year above written.

OWNER: CITY OF KENAI		CONTRACTOR:	
Ву:		By:	
Name:		Name:	
Title:		Title:	
STATE OF ALASKA))ss.	STATE OF ALASKA))ss.	
THIRD JUDICIAL DISTRICT)	THIRD JUDICIAL DISTRICT)	
THIS IS TO CERTIFY that on this day of, 20 Terry Eubank, City Manager, City of Kenai, Alaska, being perseknown to me or having produced satisfactory evidence of identifical appeared before me and acknow the voluntary and authorized execof the foregoing instrument on be said City.	onally ition, rledged cution	THIS IS TO CERTIFY that on this day of, 2023 (title) being personally known to me or having produced satisfactory evidence of identification, appeared before me and acknowledge the voluntary and authorized execution of the foregoing instrument on behalf of said corporation.	ed n
NOTARY PUBLIC FOR ALASKA My Commission Expires:		NOTARY PUBLIC FOR ALASKA My Commission Expires:	
Approved by Legal:Approved by Finance:			

GENERAL CONDITIONS OF THE CONTRACT BETWEEN OWNER AND CONTRACTOR

ARTICLE 1 CONTRACT DOCUMENTS

- 1.1 The contract documents enumerated in the Agreement between Owner and Contractor form the final and completely integrated contract between the parties and supersede any prior statements, negotiations, agreements, documents or representations, written or oral. What is required by any one contract document is deemed to be required by all documents.
- 1.2 The contract documents consist of documents designated as contract documents and enumerated in the Agreement between Owner and Contractor.
- 1.3 The contract documents do not include any documents unless specifically enumerated in Agreement between Owner and Contractor.
- 1.4 Unless specifically provided otherwise in the contract documents the parties to this agreement intend that Contractor will obtain all permits, inspections, tests, bonds, and insurance required by state or federal law, rule, regulation or order, or local ordinance or rule or regulation or the contract documents, whichever requirement is greater, and provide all labor, equipment, transportation, water, heat, utilities, tools, scaffolding, materials, supplies, facilities, and services necessary for performance of the contract and that the cost of these requirements be included within the contract price. The parties further intend that the cost of all overhead, supervision, and other incidental expenses required or occasioned by the contract is included in the contract price. The parties also intend that minor items required to produce complete functional system(s) and sub-system(s) are deemed to be required by the contract documents at the contract price whether or not specifically expressed. The requirements stated in this provision apply whether or not the execution or completion of the work is temporary or permanent and whether or not it is incorporated or to be incorporated in the work or final product.
- 1.5 The requirements of the contract documents and the duties and rights of each party may be amended subsequent to execution of this contract only by:
 - 1. A written amendment to the contract signed by both parties; or,
 - 2. A change order issued pursuant to ARTICLE 9.1
- 1.6 The term "Work" includes all procurement, labor, materials, products, equipment, erection, installation, and alterations necessary to complete the construction envisioned by this contract. The term "Project" refers to the overall construction, of which the work required by the contract may be the whole or may be a part. The term "Architect" also refers to Registered Engineers as appropriate.
- 1.7 The contract between Owner and Contractor shall be executed and returned by Contractor within the time required in the instructions to bidders. A written Notice to Proceed with the work will be issued to Contractor within five (5) days after Owner has executed the contract, except as provided in ARTICLE 4.1.3.
- 1.8 Should any provision or requirement of one portion of the contract documents conflict with any other portion of the contract documents, unless otherwise provided herein, the conflict will be resolved by reference to the contract documents in the following order of priority:
 - A. Any and all later modifications, Change Orders, and written interpretations of the Contract Documents issued by the Owner
 - B. The Agreement
 - C. Addenda
 - D. Supplemental General Conditions (if any)
 - E. General Conditions

¹ Unless otherwise stated, all references to an ARTICLE refer to the articles of these general conditions.

- F. Drawings and Specifications Provided by Engineer. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided.
- G. Drawings and Specifications in the latest edition of the Municipality of Anchorage Standard Specifications (M.A.S.S.) In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided. Contractor is responsible for obtaining the latest edition of the M.A.S.S.
- H. The Request for Proposals / Invitation to Bid
- I. The contractor's bid/proposal.
- 1.9 In case of difference between small and large scale drawings, the large scale drawings shall govern. Schedules on any contract drawing shall take precedence over conflicting information on that or any other contract drawing. On any of the drawings where a portion of the work is detailed or drawn out and the remainder is shown in outline, the parts detailed or drawn out shall apply also to all other like portions of the work.
- 1.10 In the event Contractor believes a discrepancy exists in the contract documents, Contractor shall submit the issue to the Project Representative together with Contractor's proposed course of action for performance of the work. Project Representative shall respond within seven (7) working days or advise Contractor that a response cannot be given within that time. If response will take more than seven (7) working days, Project Representative shall take steps to provide a response within a reasonable time. Any action taken by Contractor prior to or without Owner's response shall be at Contractor's own risk and expense.
- 1.11 Words and abbreviations which are not defined in the contract documents, but which have well known technical or trade meanings, shall be construed in accordance with the common meaning established by sound architectural or engineering practice in the State of Alaska.
- 1.12 Drawings, Specifications, other documents prepared for this project, and copies of them that are furnished by Owner and/or Architect or Consultant for this project, whether or not the documents or project are completed, shall be the property of Owner. All rights of use are reserved to Owner for this project and any subsequent project in which Owner participates in construction. Owner specifically relieves Architect or Consultant of any responsibility or liability pertaining to any subsequent use of the documents, in whole or in part, where those documents bear the stamp of a subsequent Architect or Consultant and are used for a subsequent project.
- 1.13 An electronic version of contract documents, typically in pdf format on a disc, will be furnished to the Contractor without charge. Contractor shall check all documents furnished immediately upon receipt and shall promptly notify Owner of any discrepancies.
- 1.14 The contract documents shall not be construed in any way as limiting Contractor's responsibility to perform the work completely, nor shall any prior customs or trade practices be held to constitute a waiver of the requirements of the contract documents or any portion of them.
- 1.15 The individual(s) executing the contract represent that they have the legal authority to execute the contract as or on behalf of Contractor in accordance with the bid instructions and the contract documents.
- 1.16 Execution of the contract by Contractor is a representation that Contractor has visited the site, become familiar with the local conditions under which the work is to be performed, has correlated personal observations with the requirements of the contract documents and enters this contract with knowledge of those conditions.

ARTICLE 2 ADMINISTRATION OF THE CONTRACT

2.1 The term "Project Representative" shall mean a person or entity employed by or under contract to Owner to be Owner's on-site designated representative. The term Project Representative shall include the Project Representative's employees.

- 2.2 The terms "Architect" or "Engineer" (hereinafter used interchangeably) shall mean the person or entity contracted by the City of Kenai to provide design services for the project. Architect or Engineer also includes employees of the Architect or Engineer. Architect shall provide professional services during construction as described herein below or as authorized by Owner.
- 2.3 Project Representative will provide administration of this contract and all communication made to Owner, Architect or Engineer by Contractor shall be made through Project Representative.
- 2.4 Project Representative will be Owner's primary representative during construction until final payment has been made and the project has been closed out. Owner's instructions to Contractor shall be made through Project Representative, who shall have authority to act on behalf of Owner to the extent set forth in this contract.
- 2.5 Project Representative shall not have the authority to require additional work, changes in the work, modifications or waivers of the rights, work or duties required by the contract documents or the right to bind Owner to any change in specifications or drawings without the written consent of Owner except as provided herein.
- 2.6 Project Representative shall have authority to allow minor deviation in the requirements of the contract documents by Field Order to a maximum cumulative amount of \$5,000.00 per each additional work item, change in work, modification or waiver in the work. Field Orders are to be incorporated into a subsequent Change Order.
- 2.7 Project Representative will render interpretations of the contract documents necessary for the proper execution or progress of the project. All interpretations and decisions of Project Representative shall be consistent with the intent of the contract documents and shall be in writing.
- 2.8 Matters relating to design intent will be referred to the design Architect whose decisions will be final, consistent with the intent of the contract documents.
- 2.9 Project Representative, Architect, and authorized representatives of Owner shall have access to the project site and to the work at all times and shall be afforded every reasonable facility for ascertaining whether or not the work is in accordance with the requirements and intent of the contract documents.
- 2.10 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be resolved pursuant to ARTICLE 12.
- 2.11 Project Representative shall have the authority: 1) to reject work which does not conform to the contract documents; 2) to require additional inspections or testing of any work during, prior to, or after fabrication, installation, or completion; 3) to specify both remedial work necessary to correct defective work and the time within which such work must be performed.
- 2.12 On the basis of on-site observations and inspections Project Representative will keep Owner informed of the progress of the work, and will endeavor to guard Owner against defects and deficiencies in the work. If Project Representative determines that any construction method, sequence, material, technique, safety precaution, act or omission of Contractor, Contractor's subcontractors, suppliers, or any of their agents, is detrimental to the progress, quality or safety of the work or to Owner's interest, then Project Representative shall inform Owner promptly, and Owner may, among other things, stop the work and order remedial measures. This provision shall not eliminate or reduce the responsibilities or requirements placed upon contractor and/or subcontractors by the contract documents and shall not place any liability upon the owner for action or omission in regard to this provision.
- 2.13 In accordance with the requirements of ARTICLE 8.5, Project Representative will determine amounts owing to Contractor and will recommend that Owner issue payment in the amount determined due.
- 2.14 Project Representative, with the concurrence of Owner, will determine the dates of Substantial Completion and Final Completion. The Architect will receive and forward to Owner for Owner's review, written warranties and related documents required by the contract and assembled by Contractor.

2.15 Project Representative's duties, responsibilities, and limitations of authority will not be modified without written consent of Owner and Project Representative.

ARTICLE 3 OWNER GENERAL RIGHTS AND DUTIES

- 3.1 At Owner's option, Owner may undertake any or all tasks of Project Representative described in ARTICLE 2.
- 3.2 Owner's directions to Contractor will be made in writing either directly or through Project Representative in accordance with ARTICLE 2. No verbal representation shall be binding upon any party unless confirmed in writing.
- 3.3 Owner shall have the right to perform work related to the project under separate contract(s) in accordance with the provisions of ARTICLE 6.
- Owner shall have the right to issue change orders from time to time which may alter the scope of work required by the contract documents. All change orders will be subject to provisions of ARTICLE 9.
- 3.5 Owner will have the authority to reject work which does not conform to the requirements of the contract documents and to require such remedial work at no charge to Owner as is necessary to correct the defective work. Where defective work is being performed by Contractor and Contractor fails to correct the defective work within a reasonable period of time as set out in ARTICLE 10, or repeatedly fails to carry out the work in accordance with the contract documents, Owner shall have the authority to order an immediate halt to all defective work. Any losses suffered by Contractor as a result of the halt shall be borne by Contractor without recourse to Owner. Issuance of a stop-work order shall not be construed as constituting a breach of the agreement nor authorize Contractor to refuse to perform other portions of the work which Owner has not halted.
- 3.6 Owner shall have the right to terminate the contract or suspend performance of the contract as set out in these general conditions or other contract documents.
- 3.7 Owner shall promptly pay Contractor all sums properly due as provided by ARTICLE 8. If Owner fails to issue payment for a period of forty-five (45) days after the certificate of payment has been approved by Project Representative, without a written statement indicating why payment is being withheld, then Contractor may terminate the contract upon seven (7) days written notice to Owner and may recover from Owner payment for all work executed and for any proven losses sustained upon any materials, equipment and tools, including a reasonable profit and overhead.
- 3.8 Owner and Contractor warrant that neither party will maintain an action against the other for punitive or exemplary damages.

ARTICLE 4 CONTRACTOR'S GENERAL RIGHTS AND DUTIES

4.1 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- 4.1.1 The term "Contractor" means the person or entity identified in the Agreement which has contracted with Owner to perform the work of the contract. This definition includes a responsible officer of Contractor's organization or its authorized representative who shall be made known to Owner.
- 4.1.2 Contractor represents by execution of the Agreement that Contractor has carefully examined the contract documents and the site upon which the work is to be performed and has developed familiarity with the nature, extent, site access, and risks involved in the work and with all local conditions and applicable statutes, ordinances and regulations that may affect the performance of the work. Contractor assumes full responsibility for having correlated Contractor's study of the contract documents and observation of the site. Contractor represents that Contractor has studied all available surveys and investigation reports of subsoil and latent physical conditions of the site and has made such additional surveys and investigations as Contractor deemed necessary for the performance of the work at the contract price, within the time specified and in accordance with the requirements of the contract documents.

- 4.1.3 Contractor shall not begin work until given a Notice to Proceed, which will be issued as promptly as possible after the Agreement has been executed by all parties. If Owner is required to delay issuance of a Notice to Proceed for more than five (5) working days because of fault of Contractor or other reasons which Owner deems sufficient, then Contractor shall be notified in writing of the delay and when issuance of the Notice to Proceed is anticipated.
- 4.1.4 Before commencing any part of the work, and prior to undertaking each subsequent phase of the work, Contractor shall carefully study the plans and specifications and check and verify all previous work and pertinent dimensions, figures and amounts shown in them and shall make all applicable field measurements. Contractor shall at once report in writing to Owner any apparent conflict, ambiguity, discrepancy, error or other omissions which Contractor may discover. Contractor shall be liable to Owner for failure to notify Owner of any conflict, ambiguity, discrepancy, error or other omissions which Contractor discovered, but failed to report to Owner and shall be responsible for providing a remedy.
- 4.1.5 Contractor shall lay out the work from established base lines and bench marks indicated on the drawings and shall be responsible for all measurements in connection therewith. Contractor will be held responsible for the execution of the work to such lines and grades. It shall be the responsibility of Contractor to maintain, preserve, or replace all stakes and other marks.
- 4.1.6 Drawings showing location of equipment, piping, etc., are diagrammatic and job conditions will not always permit installation in the location shown. If a situation occurs which may require relocation of an item or system which substantially differs from the location called for in the contract documents, it shall be brought to Owner's attention immediately and the relocation determined with the concurrence of Architect or Engineer. If Contractor relocates such items without approval, Contractor will be responsible for any cost or expense for removal or further relocation necessitated by installation without approval.

4.2 SUBMITTALS

- 4.2.1 Within 10 days after the effective date of the notice to proceed and prior to commencement of work, Contractor shall submit to Owner the construction progress schedule and schedule of values required in Articles 4.2.2, 4.2.3 and 4.2.4. The schedule of values and progress schedule must be acceptable to owner and provide reasonable divisions of contract work with corresponding payment. No payment will be made under this contract prior to completion of this requirement. In cases of a unit bid project, the bid schedule on the bid form will be the schedule of values.
- 4.2.2 In accordance with the requirements governing submittals as provided in the contract documents, Contractor shall prepare and submit to Owner a detailed progress schedule for the work which reveals and identifies the critical path of progress, which is consistent with the work and time required by the contract, and which shall provide for the most expeditious and practicable execution of the work. Float time between work items is part of the project and not property of the Contractor. Float time is defined as the amount of time that spans from completion of one previously scheduled activity and extends to the point at which the next scheduled activity is set to begin.
- 4.2.3 Contractor shall also provide Owner with a proposed schedule of values upon submittal of a detailed progress schedule for the work. The schedule of values shall be allocated to various portions of the work and be prepared in such a form and supported by such data to substantiate its accuracy as reasonably required by Owner. Each item of work shall include all applicable profit and overhead. This schedule of values, unless objected to by owner shall be the basis for progress payments made to Contractor and shall include specific lump sum amounts for "Final Payment." This line item shall be in conformance with guidelines specified in ARTICLE 8. Contractor, at the request of Owner, shall amend the progress schedule and the schedule of values as the work progresses.
- 4.2.4 The schedule of values must show a complete breakdown of all phases of the work required by the contract documents. Payment will be in accordance with ARTICLE 8. Pay requests, schedules of value and progress schedules must correspond.
- 4.2.5 Contractor shall submit for Architect's and Owner's approval all product data required by the contract documents in conformance with the dates specified in the detailed progress schedule. Such data include illustrations, standards, schedules, performance charts, instructions, brochures, diagrams, or other

- information necessary to assist Architect in determining whether a proposed product meets the intent of the contract documents.
- 4.2.6 Contractor shall also submit physical samples of materials, equipment or workmanship where required by the contract documents. After approval by Owner and Architect, the sample shall be established as the minimum standard of work, material, equipment or other quality which will be acceptable for work of which the sample is representative.
- 4.2.7 Submittal of shop drawings by contractor constitutes a representation by contractor that the submittal and work, or products required or to be used in accordance with that submittal, will meet or exceed the criteria and conditions of the contract documents and that performance of the work identified in those submittals will meet the progress schedule.
- 4.2.8 Before initiating any work for which shop drawings are required, Contractor shall obtain Architect's approval of the shop drawings, which include drawings, diagrams, schedules and other data specially prepared by Contractor, a subcontractor, a manufacturer, a supplier or distributor to illustrate in detail that portion of the work. Contractor shall review, approve, and submit all shop drawings, whether prepared by himself/herself or subcontractor or supplier. It shall be the duty of Contractor to provide a whole or complete system and to coordinate all work depicted by a particular shop drawing with the work required by other shop drawings for that portion of the work or for related or adjacent work.
- 4.2.9 Contractor shall provide a copy of all transmittal letters to Project Representative at the time the submittal is made to Architect. Architect will review Contractor's submittals only for conformance with the design concept of the work and the information given in the contract documents. Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Architect will return reviewed submittals to Contractor with written comments and forward one set to Project Representative with reasonable promptness so as to cause no delay. A minimum of five (5) sets of submittals shall be required.
- 4.2.10 Should Architect reject any proposed shop drawings, product data or sample, Contractor shall resubmit revised drawings, samples or product data and draw Architect's attention to any deviation or revisions other than those requested by Architect.
- 4.2.11 All of Contractor's submittals shall be made in conformance with the dates specified in the detailed progress schedule with reasonable promptness and in such sequence as to cause no delay in the work of Owner or any separate contractor.
- 4.2.12 The Contractor shall provide two (2) hard copies and an electronic .PDF file of the operation and maintenance manuals for equipment and systems incorporated in the work.

4.3 SAFETY AND CONTROL OF SITE

- 4.3.1 Contractor is deemed to be in physical control of the work site. Contractor shall confine Contractor's operations at the site to those areas described in the contract documents or permitted by applicable statutes, ordinances or permits.
- 4.3.2 Contractor shall not unreasonably encumber the site with materials, equipment or ancillary construction. Contractor shall be responsible for eliminating or minimizing to the extent reasonably possible, public hazards and inconveniences which might result from this work.
- 4.3.3 Contractor shall at all times keep the premises free from accumulation of excess snow, waste materials or rubbish and shall keep adjacent public road clear of mud and dust caused by Contractor's activities. At the completion of the work, Contractor shall remove all waste materials and rubbish from the project as well as Contractor's tools, equipment and surplus materials. The removal and disposal of waste materials, rubbish, or other material, shall be accomplished in accordance with all local, state and federal requirements.
- 4.3.4 Contractor shall be responsible for initiating, maintaining and supervising all necessary safety precautions in connection with this work and shall be responsible for ascertaining and adhering to all applicable federal, state, and local standards, laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the safety of persons or property or their protection from damage, injury, or loss.

- 4.3.5 Contractor's duty to maintain a safe and secure project site shall include all precautions necessary to assure the safety and protection against injury and damage, of all employees engaged in the work and any other person who may be affected by the work including Owner's agents and employees; Contractor's agents and employees; and members of the general public. Contractor shall assure the safety and protection of all work, materials and equipment which may be upon the site; utilities and other property of Owner including portions of structures and utilities not designated for removal or relocation, trees, shrubs, lawns, walks, pavements and roadways. Contractor duties include but are not limited to protection of project site from vandalism. Such precautions shall further include but not be limited to protection from dangers from hazardous materials.
- 4.3.6 Contractor shall take all necessary measures to prevent members of the general public from entering upon the site without the permission of Owner or Contractor.
- 4.3.7 Contractor shall comply with all OSHA requirements, give all safety notices, erect and maintain all reasonable safeguard notices and barriers, including danger signs and fences which may be required to protect the site and limit access to it.
- 4.3.8 In the event of an emergency, the Contractor will take all means necessary to minimize all damage to or exposure from effects of a catastrophic event. In such case, the Contractor may consult with Owner or seek Owner's assistance. The responsibility for protection of the site, work, and all material remains with the Contractor.
- 4.3.9 Contractor shall designate a person in Contractor's employ at the site to be primarily responsible for the prevention of accidents, identification of all applicable safety standards, statutes and regulations, including but not limited to those addressing hazardous material, and full compliance therewith. This person shall be Contractor's Superintendent unless otherwise designated by Contractor in writing to Owner.
- 4.3.10 Should Project Representative or other representative of Owner ascertain that a safety danger exists, Project Representative or Owner may order an immediate cessation of all dangerous activity and a correction of any safety hazard. Written notice of the order to stop work or to correct the safety hazard shall be made to Contractor as soon as practicable. Contractor shall have no recourse against Owner for any alleged losses or delays arising from this section unless the order to stop work or correct safety deficiency is wholly without basis.
- 4.3.11 Should Contractor elect to utilize explosives or other hazardous materials or equipment, or should Contractor be required to do so for the execution of the work, Contractor shall first give jurisdictional authorities and Owner notice of the intention to utilize hazardous materials, explosives or equipment at a particular time and date. Contractor shall use the utmost care in utilizing such materials and shall use only properly qualified and licensed personnel.
- 4.3.12 Contractor shall correct any damage to the property of Owner or other parties which arises out of the activities or omissions of Contractor, Contractor's agents, subcontractors, employees, personnel or suppliers. Contractor shall commence remedial activities within seven (7) days from the date of the damage. If Contractor fails to do so, Owner or the affected party may utilize his own forces to correct or replace the damaged property and Contractor shall promptly reimburse Owner or the affected party for all losses and costs thereupon. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor.

4.4 SUPERVISION AND QUALITY OF THE WORK

4.4.1 Contractor shall supervise and direct the work using the best skill and attention. Contractor is responsible for, and agrees to comply with all applicable local, state and federal ordinances, laws, regulations and statutes. Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for the schedule and coordination of all portions of the work to be performed under the contract. Contractor shall also be required to coordinate the work with that of any other contractor working on the project so as to minimize delay, inconvenience, and expense to both. Where identified in writing by Owner at any time, Contractor shall be required to coordinate the work with any partial use of the site that Owner deems necessary.

- 4.4.2 All materials and equipment shall be applied, installed, connected, erected, used, cleaned, prepared or conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processor except as otherwise provided in the plans and specifications.
- 4.4.3 Contractor shall keep on the job site at all times during work progress, a competent resident superintendent capable of reading and thoroughly understanding the plans and specifications. The superintendent will be Contractor's representative at the site and all communications given to the superintendent shall be as binding as if given to Contractor directly. In the event Contractor decides to replace the superintendent, Contractor shall submit to Owner a written notice including the proposed new superintendent's qualifications. The superintendent shall not be replaced without this written notice and a statement of non-objection by the Owner.
- 4.4.4 Contractor shall provide sufficient, competent, and suitable qualified personnel to survey and lay out the work and to perform all construction required by the contract documents. Contractor is responsible for maintaining good discipline and order at the job site at all times and shall not employ any unfit person or anyone not skilled in the task assigned to that person.
- 4.4.5 Contractor shall be fully responsible to Owner for the acts and omissions of Contractor's employees and agents, Contractor's subcontractors and their employees and agents, and any other persons performing any of the work for the benefit of Contractor.
- 4.4.6 Contractor shall not permit the possession or use of alcohol or controlled substances on the site, and shall remove from the site any person who possesses, uses, or is under the influence of alcohol or controlled substances. Contractor shall require all Contractor's agents, subcontractors, employees or suppliers who perform work on site to sign a statement that they have been informed and will abide by the above policy. A copy of all such statements shall be kept at the job site throughout the duration of Contractor's work.
- 4.4.7 Contractor warrants to Owner that all work will be free from faults and defects and meeting or exceeding the requirements of the contract documents and all local, state, and federal legal requirements. All work not so conforming to these standards will be considered defective, and Owner may require its correction.

4.5 DIVISION OF THE WORK

4.5.1 The division of the work into various specialties and divisions in the contract specifications and drawings shall not bind Contractor in apportioning the work among various subcontractors, specialty contractors or workers, and Contractor's own employees.

4.6 TITLE 36 AND OTHER STATUTORY REQUIREMENTS

- 4.6.1 Contractor shall give and post all notices and comply with all federal, state, and local laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the performance of the work, and shall notify Owner in writing if the drawings and specifications or the contract documents are at variance therewith. If Contractor knows or should know that Contractor is performing work contrary to such legal requirements without giving written notice to Owner in time for Owner to give a stop work order, the Contractor shall bear all costs to remedy that work and to bring it into conformance with the applicable requirements. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor. This requirement does not lessen or alter the requirement for indemnification stated in ARTICLE 4.13.
- 4.6.2 Contractor and subcontractors shall strictly comply with all requirements of Title 8, Chapter 30 of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract.
- 4.6.3 Contractor or subcontractors of the contractor shall pay all employees unconditionally as required by AS 36.05.040 and any other applicable laws or regulations. Wages may not be less than those stated in the advertised specifications, regardless of the contractual relationship between the Contractor or subcontractors and laborers, mechanics, or field surveyors. The wages are determined for the region in which the work is done and the rates are issued by the Alaska State Department of Labor (see attached Title 36 wage schedule). The scale of wages to be paid shall be posted by Contractor in a prominent and easily accessible place at the site of the work. If it is found that a laborer, mechanic or field surveyor employed by the Contractor or subcontractor has been or is being paid a rate of wages less than the rate

of wages required by this contract, Owner may, on written notice to Contractor hold Contractor in immediate default and terminate Contractor's right to proceed with the work or that part of the work for which there is a failure to pay the required wages, and Owner may prosecute the remaining work to completion by contract or otherwise, holding Contractor and Contractor's sureties liable for any costs in excess of the contract price. In the event Owner permits Contractor to pursue further work under the contract, Owner shall withhold so much of the accrued payments as is necessary to pay to laborers, mechanics, or field surveyors employed by the Contractor or subcontractors the difference between the rates of wages required by the contract to be paid laborers, mechanics, or field surveyors on the work and the rates of wages in fact received by laborers, mechanics, or field surveyors.

4.6.4 A copy of certified payrolls shall be provided to the Project Representative with each Progress Payment Request.

4.7 PROJECT RECORDS

- 4.7.1 Contractor shall maintain at the project site copies of plans and technical specifications, approved shop drawings and manufacturers' information sheets, and other contractor documents which are necessary for the expeditious and correct execution of the work.
- 4.7.2 Contractor shall maintain at the project site a complete daily job report showing job conditions, work activities started, in progress, interrupted and completed; work force, including identification and number of Contractor's employees and subcontractors by craft; receipt and disposition of materials and equipment; tests performed, visiting personnel and any accidents on a particular day. Owner shall have access to the daily report at all times. A copy of each daily report shall be provided to Project Representative at the end of each week.
- 4.7.3 Contractor shall keep one record copy of all specifications, drawings, addenda, modifications, and shop drawings at the job site in good order and annotated to show all changes made during the construction process. These shall be available to Owner during construction and turned over to Owner prior to final completion of the work.

4.8 ALLOWANCES

4.8.1 Contractor shall include in the contract sum all allowances stated in the specifications or plans, and all items covered by these allowances shall be supplied in such amounts, or by such a person, as Owner may direct. The allowance shall include the cost to Contractor, less applicable trade discounts, of materials and equipment required by the allowance; delivery at the site, applicable taxes; Contractor's cost for unloading and handling on the site, for labor, installation, overhead, profit and other expenses incurred by Contractor. Whenever the cost of the allowed item exceeds or is less than the allowance, the contract sum shall be adjusted equitably by change order.

4.9 NONDISCRIMINATION

- 4.9.1 Contractor must comply with all federal and state laws, rules, regulations and orders, and all local ordinances, regulations and rules concerning wages, taxes, social security, workers' compensation, nondiscrimination, licenses, registration requirements, and similar provisions governing employment of individuals.
- 4.9.2 Contractor will not discriminate against any employee or applicant for employment or refuse employment to a person, or bar a person from employment, or discriminate against a person in compensation or in a term, condition, or privilege of employment because of the person's race, religion, color, or national origin, or because of the person's age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, or parenthood when the reasonable demands of the position do not require distinction on the basis of age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, parenthood, or political affiliation. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Contractor further agrees to insert this provision in all subcontracts hereunder and to require the subcontractors to insert this provision in their subcontracts.

Notwithstanding the prohibition against employment discrimination on the basis of marital status or parenthood stated above, an employer may, without violating this provision, provide greater health and retirement benefits to employees who have a spouse or dependent children than are provided to other employees.

- 4.9.3 Contractor shall state, in all solicitations or advertisements for employees to work on contract jobs, that all qualified applicants will receive consideration for employment in accordance with the above referenced nondiscrimination clause.
- 4.9.4 Contractor shall comply with the reporting requirements which the State of Alaska may establish by regulation.
- 4.9.5 Contractor shall include the provisions of these paragraphs in this section in every subcontract or purchase order under this contract so as to be binding upon every such subcontractor or vendor of Contractor under this contract.

4.10 TAXES

- 4.10.1 Contractor shall pay all sales, consumer, use and other taxes for the work or portions thereof provided by Contractor which are legally enacted at the time bids are received, whether or not yet effective.
- 4.10.2 Contractor shall comply with Owner's requirements for payment of taxes. This contract is specifically subject to the provisions of City of Kenai Code, as it now stands or as it may be amended, including but not limited to termination of the contract for non-compliance. If the violation arises from failure to file or remit sales taxes, no payment will be made to Contractor until all filings have been made and all amounts due are paid.

4.11 PERMITS, FEES, AND NOTICES

- 4.11.1 Contractor shall secure the building permit from the City of Kenai at no cost. Unless otherwise provided in contract documents, Contractor shall secure and pay for all other legally required permits and government fees, licenses and inspections necessary for the proper execution and completion of the work. These are customarily secured after execution of the contract. These costs are part of the contract price. This provision does not lessen the requirements set out in ARTICLE 1.4.
- 4.11.2 Contractor is required to comply with all permits obtained by Owner for project, if any. Contractor is responsible for requesting information from Owner regarding any applicable permits obtained by Owner.

4.12 ROYALTIES AND PATENTS

4.12.1 Contractor shall pay for all royalties and license fees. Contractor shall defend all suits or claims for infringement of any patent rights and shall save Owner harmless from loss on account thereof.

4.13 INDEMNIFICATION

4.13.1 The contractor shall indemnify, hold harmless, and defend the City at its own expense from and against any and all claims, losses, damages or expenses, including reasonable attorney's fees, of, or liability for, any wrongful or negligent acts, errors, or omissions of the contractor, its officers, agents or employees, or any subcontractor under this contract. The contractor shall not be required to defend or indemnify the City for any claims of, or liability for, any wrongful or negligent act, error, or omission solely due to the independent negligence of the City. If there is a claim of, or liability for, the joint negligence of the contractor and the independent negligence of the City, the indemnification and hold harmless obligation shall be apportioned on a comparative fault basis. Apportionment shall be determined upon final determination of percentage of fault. If any such determination is by settlement, the percentage of fault attributed to each party for purposes of this indemnification provision shall only be binding upon the parties included in the settlement agreement. "Contractor" and "City" as used in this article include the employees, agents, officers, directors, and other contractors who are directly responsible, respectively, to each. The term "independent negligence of the City" is negligence other than in the City's selection, administration, monitoring, or controlling of the contractor and in approving or accepting the contractor's work.

ARTICLE 5 SUBCONTRACTORS AND SUPPLIERS

5.1 DEFINITIONS AND RESPONSIBILITIES

- 5.1.1 A subcontractor is a person or entity having a direct contractual relationship with Contractor, or with one of Contractor's subcontractors, to perform any of the work at the site. A supplier is any manufacturer or person or firm providing materials, equipment or assemblies to Contractor or to one of the subcontractors for inclusion in this project.
- 5.1.2 All contracts between Contractor, subcontractors and suppliers (whether or not in privity with Contractor) shall be in accordance with the terms of this contract and shall incorporate the General Conditions of this contract. Contractor shall include in such contracts, and require its inclusion in any subcontracts, a provision holding any subcontractor or supplier (whether or not in privity with Contractor) directly accountable to Owner for work which fails to meet the requirements of the contract documents, or which prevents Contractor or any subcontractor from performing work. This direct accountability to the Owner shall be in addition to Contractor's liability for any such failure.
- 5.1.3 The provisions in this ARTICLE shall not be construed as creating a right of recourse, or any direct contractual relationship, between Owner or Owner's agents and any subcontractor, supplier, or manufacturer (whether or not in privity with Contractor).
- 5.1.4 Contractor shall make all necessary copies of these contract documents available to Owner and to each subcontractor and shall require each subcontractor to make copies of these contract documents available to each of Contractor's subcontractors, if any.
- 5.1.5 Contractor shall be fully responsible for enforcing discipline among subcontractors, their employees and their subcontractors, and for insuring that each subcontractor performs the work in accordance with the contract documents and all safety regulations.
- 5.1.6 Contractor shall have the discretion to require subcontractor(s) to provide payment or performance bonds for work of the subcontractor(s).

5.2 AWARDS TO SUBCONTRACTORS AND SUPPLIERS

- 5.2.1 At Owner's request Contractor shall submit to Owner a list of all principal subcontractors and material suppliers and shall not contract with any proposed person or organization to whom Owner voices a reasonable objection. This provision applies to substitution of subcontractors or suppliers subsequent to Owner's initial objection to a proposed person or entity. Such list shall be submitted in accordance with Division 1 requirements as provided in the contract specifications.
- 5.2.2 Rejection of a proposed subcontractor or material supplier shall not entitle Contractor to any increase in the contract sum or time.
- 5.2.3 At Owner's request Contractor shall submit to Owner a copy of any subcontract and any purchase orders for materials and equipment prior to purchase of such items.

5.3 CONTRACTOR PAYMENTS TO SUBCONTRACTORS AND SUPPLIERS

- 5.3.1 Recognizing the importance of maintaining the integrity of a public contract, Contractor warrants that Contractor will pay all subcontractors and material suppliers at least monthly on or about the 20th day of each month upon approval of the subcontractors' and materials suppliers' billing, for all apparently acceptable work performed on the site during the preceding month and for all apparently acceptable material incorporated into the project or delivered and properly stored at the site during any month for which Contractor has received payment from Owner. If Owner retains a percentage of sums due, Contractor may retain a like percentage, but when retainage is paid, Contractor must pay to the subcontractor or supplier interest on retainage equal to interest rate paid to Contractor by Owner.
- 5.3.2 In furtherance of Contractor's warranty under this ARTICLE and ARTICLE 8, Owner, may require Contractor to declare Contractor's status of accounts with any or all the subcontractors and suppliers. A proof of payment to subcontractors and suppliers shall be made in a form acceptable to Owner. If Contractor

breaches this warranty and fails to pay each subcontractor and materials supplier within 45 days after a monthly billing has been presented, then Owner reserves the right to withhold sufficient sums from Progress Payments due to Contractor and to issue payment to the subcontractors or material suppliers directly. This ARTICLE shall not be construed as creating a right in the subcontractors or material suppliers to have direct recourse against Owner for payment. Contractor expressly agrees that Owner will not be liable for any exercise of Owner's discretionary right under this section, and Contractor agrees to release and indemnify Owner for any claims arising therefrom, either by Contractor directly or by any subcontractor or material supplier. Likewise, this ARTICLE shall not be construed as creating a right in Contractor's surety or any other subrogated party to have direct recourse against Owner for failure to withhold sums pursuant to this section.

ARTICLE 6 SEPARATE CONTRACTS

- 6.1 Owner has the right to award separate contracts for work on the project that is not included in this contract.
- 6.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the contract documents in each case shall mean the Contractor who executes each separate contract.
- 6.3 Contractor shall afford other contractors and Owner's own forces reasonable opportunity for the introduction and storage of materials and equipment and for the execution of their work and shall properly connect and coordinate Contractor's work with theirs as required by the contract documents.
- 6.4 Any costs caused by defective or ill-timed work under separate contracts shall be borne by the party responsible thereof and shall be paid promptly.
- When separate contracts are let within the limits of any one project, each Contractor shall conduct the work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.
 - Each Contractor involved shall assume all liability, financial or otherwise, in connection with his or her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.
- 6.6 If any part of Contractor's work depends upon work performed by Owner or any separate contractor, prior to proceeding with the work, Contractor is required to report to Owner any apparent discrepancies, defects or delays in the other work which impede proper execution of the work required by this contract. If Contractor fails to report such unsuitable work by another contractor to Owner, then Contractor shall be deemed to have accepted the unsuitable work and any liability for all deficiencies, damages and costs which arise as a result of the defective work or of Contractor's use or covering of the unsuitable work.
- 6.7 Should Contractor or any subcontractor delay or cause damage to the work or property of any other contractor or person, Contractor shall repair the damage or settle the claim and shall further, to the extent allowed by law, indemnify, defend, and hold Owner harmless from any and all claims, costs, expenses, injury, damages, or loss of any kind, including attorneys' fees, court costs, or arbitration costs, which arise out of such delay or damage.
- 6.8 Should a dispute arise between Contractor and separate contractors as to the responsibility for completing, finishing or cleaning up particular work or a portion of the work, Owner may complete, finish or clean up the disputed portion and apportion the cost among Contractors responsible as Owner shall determine to be equitable.

ARTICLE 7 BONDS AND INSURANCE

7.1 PERFORMANCE AND PAYMENT BONDS

7.1.1 For contracts with a contract sum of one hundred thousand dollars (\$100,000) or greater, or as otherwise specified in the request for bid, Contractor shall provide as part of the basic contract sum, a performance bond and a payment bond, each in the amount of 100% of the contract amount, prior to Owner's execution

of the contract. Contractor shall have no recourse of any kind against Owner, if Owner declines to award a contract due to Contractor's failure to provide the required bonds. These bonds, in whatever amount required by the specific contract, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25 and shall comply with all requirements for payment and submission of claims as provided by that chapter.

- 7.1.2 All bonds shall name Owner as the beneficial party and shall protect Owner for a period of at least one year subsequent to the date of final payment upon this contract. All bonds shall be executed upon a form acceptable to Owner and by a surety company licensed to do business within the State of Alaska and acceptable to Owner. The form of the bond shall provide that Owner shall have at least thirty (30) days prior notice of any lapse in bond coverage. The bond payment shall be applicable to all subcontractors or material suppliers (whether or not in privity with Contractor) who might attempt to assert a claim against Owner.
- 7.1.3 Owner may inform the surety as to the general progress and status of the work. A copy of all communications with the surety company shall be provided promptly to Contractor upon request.
- 7.1.4 In the event Contractor refuses, or is unable to make payments to laborers, subcontractors or material suppliers, or to complete the work, or to correct defective work, within the times provided by this contract, Owner may elect to call upon Contractor's surety to rectify Contractor's default. Contractor shall first be given seven (7) calendar days written notice (effective when mailed) of Owner's intentions to call upon the surety company and Owner shall specify to Contractor the basis for the proposed course of action. If Contractor fails to correct the default within the time provided, Owner shall promptly call upon the surety.
- 7.1.5 Prior to final payment or reduction in retainage, Contractor shall provide written consent of each affected surety releasing Owner from any further claims arising from payment to Contractor and obligating the surety company to rectify any default, nonpayment, defective work, error, omission or deficiency of Contractor.
- 7.1.6 Contractor and Owner expressly agree that Owner shall be entitled to retain from payments to Contractor amounts in excess of normal retainage if these additional amounts may be necessary to indemnify Contractor's surety for any payment or corrective work which the surety might be required to undertake. This additional retainage will be made only upon written directive by Contractor's surety specifying the reason for retaining extra amounts, the amounts to be retained and agreement of the surety to reimburse Owner for any interest which may be due Contractor under the provisions of the Alaska Statutes.

7.2 CONTRACTOR'S INSURANCE

- 7.2.1 The services to be rendered under this contract are those of an independent Contractor.
- 7.2.2 Contractor and all subcontractors, if any, shall be responsible for the purchase and maintenance of all insurance required by law and at a minimum purchase the insurance coverage as specified in ARTICLE 7.2.5 and 7.2.6 below, and any other insurance coverage as may be specified in ARTICLE 7.2.11 SUPPLEMENTARY GENERAL CONDITIONS OF INSURANCE, if attached and forming a part of this contract. Such insurance shall be by a company/corporation currently rated "A-" or better by A.M. Best.
- 7.2.3 This insurance coverage required by ARTICLE 7.2.5 and 7.2.6, and ARTICLE 7.2.11 if attached, shall be in acceptable form, and for the amounts specified by the City of Kenai, or as required by law, whichever is greater.
- 7.2.4 The insurance policies shall remain in force for the life of the contract and shall be a part of the contract price.
- 7.2.5 Commercial general liability with minimum coverage of \$1,000,000 and automobile liability insurance with minimum coverage of \$1,000,000 combined single limit bodily injury and property damage per occurrence. This insurance shall be primary and exclusive of any other insurance carried by the City of Kenai. The commercial general liability insurance shall be without limitation on the time within which the resulting loss, damage, or injury is actually sustained.
- 7.2.6 Per Alaska State Statutes, Worker's Compensation and Employers Liability Insurance shall be provided for all employees who are performing work under this contract.

- 7.2.7 Certificate(s) of Insurance shall be provided by Contractor and all subcontractors, or their Insurance Companies and/or their Agents, naming the City of Kenai as an additional insured for the work specified in this contract with a waiver of subrogation for commercial general liability insurance and automobile liability insurance. The certificates of insurance must reference the specific contract by name. Workers compensation insurance must be endorsed for waiver of subrogation against the City. Certificates of Insurance, acceptable in form and content, will be delivered to Owner at the address designated for legal service in the agreement, at or prior to presentation of the contract for execution by owner.
- 7.2.8 There shall be no cancellation or material change of the insurance coverage, or intent not to renew the insurance coverages as specified in this contract, without thirty (30) days prior written notice to the City of Kenai. Notice of cancellation, material change in coverage, or intent not to renew will be delivered to the address designated for legal notice in the agreement.
- 7.2.9 Upon renewal or change in policies during the contract, Certificates of Insurance shall be delivered to the address designated for legal notice in the agreement.
- 7.2.10 Owner shall have the option to purchase and maintain such insurance as will protect Owner against property losses or liability claims, which may arise from operations under the contract. Insurance providing coverage against fire and extended coverage perils, may, at Owner option, provide coverage to the full insurable value of the project and insure the interests of Contractor and all subcontractors as their interests may appear. Any recovery for loss insured pursuant to this General Condition is to be adjusted to Owner and made payable to Owner as trustee for the insured, as their interests may appear. This section does not modify the contractor or subcontractors' responsibility to provide insurance as required in ARTICLE 7.
- 7.2.11 May be added in supplementals as Supplementary General Conditions of Insurance.

ARTICLE 8 MEASUREMENT, PAYMENT AND COMPLETION

8.1 SCOPE OF PAYMENT

8.1.1 Unless altered by change order, Contractor shall be paid only that sum set forth in the agreement between Owner and Contractor as Contractor's compensation for performance of all work required by the contract documents.

8.2 LUMP SUM PAY ITEMS

- 8.2.1 Each bid item is characterized as either a lump sum item or a unit price item in the bid documents. Where the item is bid at a lump sum price, no additional compensation shall be paid to Contractor for additional work required because Contractor failed to include items or quantities in Contractor's estimate or a subcontractor's estimate, or failed to utilize proper construction means, methods, procedures or sequence or by virtue of any decision of Contractor.
- 8.2.2 Contractor is required to provide and pay for all requirements necessary for the proper execution and completion of the contract unless specifically excluded by the contract documents. The costs are part of the contract price. The requirements include but are not limited to the requirements stated in ARTICLE 1.4.
- 8.2.3 All materials and equipment incorporated in the work shall be new except as otherwise provided in the contract documents. All materials and equipment shall meet or exceed the requirements of the plans and specifications and Contractor shall furnish, if requested, satisfactory evidence as to the source, kind and quality of any materials and equipment.

8.3 UNIT COST ITEMS

8.3.1 Quantities appearing in the bid schedule are approximate and are prepared for comparison of bids. Payment to Contractor will be for actual quantities of work performed and materials furnished in accordance with the contract documents. Scheduled quantities of work and materials may be increased, decreased or eliminated as provided herein.

8.4 APPLICATION FOR PAYMENT

- 8.4.1 Applications for payment shall be based on Contractor's submitted schedule of values, as approved by Owner per Section 4.2. Schedule of values shall be prepared in such form and supported by such data as may be required by Owner to substantiate its accuracy prior to Contractor's first application for payment.
- 8.4.2 The schedule of values shall include quantities of work, unit prices and other items comprising the contract price. It shall subdivide the work into each component part in sufficient detail to serve as the basis for progress payments during construction.
- 8.4.3 With each subsequent application for progress payment, Contractor shall provide a schedule of values to Owner showing all work which has been performed to date together with the value thereof, and the percentage of work completed.

8.5 PROGRESS PAYMENTS

- 8.5.1 Progress Payments shall be made monthly, based upon the amount of apparently acceptable work performed at the site and apparently acceptable materials purchased for the project and properly stored at the site during the previous month. Disbursement of progress payments will not effect a transfer of the risk of loss from the Contractor to the Owner for invoiced equipment or material. The risk of loss of the work and all material and equipment not yet incorporated in the work is the liability of the Contractor until substantial or final completion, whichever is earlier.
- 8.5.2 The value of work performed and materials stored shall be set forth in Contractor's revised schedule of values. If requested by Owner, Contractor shall promptly provide Owner any additional information necessary to ascertain the value of the work performed or the cost of materials stored at the site during the previous month. Each updated Schedule of Values shall be in the form of a notarized affidavit. Proof of certified payroll shall be provided per ARTICLE 4.
- 8.5.3 By application for payment, Contractor warrants and guarantees to Owner that title to all work, materials, and equipment for which payment is requested will pass to Owner either by incorporation in the construction and after substantial completion or upon receipt of payment, whichever occurs later, that such title will be clear of all liens, claims, security interests, and other encumbrances, except for liens to be released later prior to final payment and specifically identified on the application for payment, and that all such work, materials, and equipment are of acceptable quality.
- 8.5.4 Each application for payment shall be made no later than the tenth day of each month for work performed during the preceding month. Progress Payment requests shall be submitted to Project Representative for analysis and recommendation to Owner.
- 8.5.5 Project Representative will review Contractor's application for payment within seven (7) working days after receipt and if Project Representative ascertains that the amounts set forth therein are properly due and owing to Contractor, then Project Representative shall issue a Certificate of Payment to Owner. If Project Representative determines that only a portion of the sum requested is then properly due and owing to Contractor, then Project Representative may issue a Certificate of Payment in a lesser amount or may reject the application altogether. Project Representative will notify in writing both Contractor and Owner of the reasons for reduction or rejection of any application for Progress Payment.
- 8.5.6 Project Representative's issuance of a Certificate of Payment constitutes a representation that the work has progressed to the point indicated and that to the best of Project Representative's professional knowledge and information, Contractor is entitled to payment in the amounts certified.

8.6 RETAINAGE

8.6.1 After receipt from Project Representative of the Certificate for Payment, Owner shall make payment to Contractor within thirty (30) days. Owner shall have the option to retain up to 10% of the full amount of the Certificate for Payment plus lump sum amounts for material and equipment not properly stored, or subject to damage prior to use. Amounts retained by Owner may be held by Owner until project completion. If the project involves grant money or the City has entered into a written contract with the state to provide state funds, payment will be made in accordance with AS 36.90.200-270.

8.6.2 Owner may withhold additional sums of money from progress payments in an amount sufficient to safeguard and protect Owner against any apparently meritorious claims against Contractor by any party other than Owner, and for any work which Owner ascertains to be defective or not meeting the requirements of the contract documents.

8.7 CONDITIONS OF PAYMENT

- 8.7.1 Project Representative may refuse to approve all or any part of any request for progress payment if, in Project Representative's opinion, it would be incorrect to make the representation to Owner set out in ARTICLE 8. Project Representative may also refuse to approve all or any part of any request for progress payment, if subsequently discovered evidence or the results of subsequent inspections or tests nullify any payment previously approved.
- 8.7.2 Owner may withhold payment to the extent necessary to protect Owner from loss resulting from:
 - Defective or damaged work;
 - B. Claims or liens which have been filed or may be reasonably expected;
 - C. Contract price reduction by modifications or change orders;
 - D. Owner cost to correct or complete defective work;
 - E. Unsatisfactory prosecution of the work by Contractor, including but not limited to failure to furnish adequate submittals or to clean up the work or site;
 - F. Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum;
 - G. Failure of Contractor to make payment properly due to subcontractors, employees, suppliers or utilities;
 - H. Reasonable evidence to believe the work cannot be completed within the contract time.
 - I. Damage to Owner's property not replaced or repaired in timely manner.

When the grounds for withholding payment are removed, payment shall be made for amounts withheld.

8.7.3 Neither the issuance of a Certificate of Payment, nor the making of any progress payment, nor the partial or entire use of the project by Owner shall constitute an acceptance of any work not in accordance with the contract documents nor shall it constitute a waiver of any right accruing to Owner or of any duty of Contractor.

8.8 SUBSTANTIAL COMPLETION

- 8.8.1 Substantial Completion is defined as the state of construction at which the work is sufficiently complete and in accordance with the contract documents, so that Owner could occupy and utilize the work or a specific portion of it, for its intended use.
- 8.8.2 When Contractor considers the work substantially complete Contractor shall notify Project Representative in writing and request a Substantial Completion inspection. The request shall be made a minimum of three business days in advance. The notice shall include a comprehensive list of items to be completed, reasons they are not completed and a date of anticipated completion. The notice shall also include copies of all code compliance inspections, the Certificate of Occupancy, if applicable, and any other documents required by the contract.
- 8.8.3 Project Representative shall schedule the Substantial Completion inspection and notify Contractor. The inspection will be performed by Project Representative, Architect, Design Engineers, and Owner personnel in the presence of Contractor. Should this inspection find the work not substantially complete, Owner may terminate the inspection and promptly notify Contractor in writing of the conditions for reinspection. Any deficiencies identified by this inspection will be listed and promptly furnished to Contractor for remedial action.
- 8.8.4 If Contractor has requested that Project Representative and Owner make an inspection to ascertain Substantial Completion, and if the work is not then substantially complete, Contractor shall be liable for all costs Owner, Architect, and Project Representative have incurred in making the inspection.

- 8.8.5 If it is determined on the basis of inspection that the work is substantially complete, Project Representative will issue a Certificate of Substantial Completion. Included in the certificate shall be a list of items which must be completed or corrected before final payment and the time within which such items shall be complete and corrected. Failure to include an item on this list does not alter the responsibility of Contractor to complete all work in accordance with contract requirements.
- 8.8.6 Certificate of Substantial Completion shall state the date of Substantial Completion and the respective responsibilities of Owner and Contractor for the maintenance, insurance and security of the work. Certificate of Substantial Completion shall specifically authorize Owner to take possession of the premises and utilize them for their intended purpose. Owner's beneficial occupancy of the premises shall make reasonable allowance for the performance of the work which Contractor must complete prior to final completion.
- 8.8.7 If Contractor fails to complete or correct work required by the Certificate of Substantial Completion within the time allowed, then the Certificate of Substantial Completion shall be voided and the contract time expended by Contractor shall be counted, and the acceptability of the work shall be inspected as if a Certificate of Substantial Completion had not been issued.
- 8.8.8 Upon Substantial Completion of the work and upon application by Contractor and certification by Project Representative, Owner shall make payment, reflecting adjustment in retainage, if any, for such work as provided in the contract documents.

8.9 FINAL COMPLETION AND WARRANTY PERIOD

- 8.9.1 The terms Final Completion and Warranty Period refer to, respectively, the finalization of the construction phase and a one-year warranty period following the Substantial Completion. Final Completion shall be represented by a lump sum dollar amount identified on the schedule of values. Final Payment represents a sum of money to perform all tasks necessary from Substantial Completion to Final Completion, including completion of final punch list, completion of as-built data, turnover of all warranty information, notarized acknowledgments of payments, and relinquishment of claims against Owner.
- 8.9.2 When Contractor considers the work ready for Final Completion, Contractor shall forward to Project Representative an application for final payment including (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied, (2) consent of surety, if any, to payment, (3) irrevocable, notarized proof of payment and relinquishment of claim against Owner, issued by every subcontractor (whether or not in privity with Contractor), material supplier and other party who might assert a claim against Owner, and (4) all other documentation required by the contract documents. Project Representative and Owner shall promptly inspect the work to see that it is fully performed and complete, that all portions of the work are acceptable and that the contract is fully performed aside from completion of the Warranty Period. After Project Representative has made a determination that these requirements have been met, Project Representative shall prepare and recommend that Owner issue a Certificate of Final Completion and Final Payment.
- 8.9.3 Project Representative's approval of Final Payment constitutes an additional representation by Project Representative to Owner that to the best of Project Representative's knowledge and information, all conditions which Contractor must fulfill prior to being entitled to Final Payment have in fact been fulfilled in accordance with the contract documents.
- 8.9.4 If any party refuses to relinquish its claim, or if Owner considers that any item or portion of the work: (1) is of doubtful acceptability under the contract documents; or (2) may diminish the value of the work; or (3) may prove to be ultimately unreliable; or (4) may prove to be less functional than required by the intent of the contract, then Owner, in lieu of refusing Final Payment to Contractor, may allow Contractor to furnish a bond in a form and in an amount satisfactory to indemnify Owner against losses occasioned thereby. If any additional costs to settle the claim or to correct work of doubtful quality accrue to Owner in excess of the indemnity available to Owner, Contractor shall refund to Owner all differences and costs which Owner might be compelled to pay, including all litigation costs and reasonable attorney fees.
- 8.9.5 Acceptance of final payment by Contractor constitutes an explicit waiver of all claims which Contractor might assert against Owner except those previously made in writing and identified by Contractor as unsettled at the time of the Application for Final Payment.

- 8.9.6 Final Payment to Contractor shall constitute a waiver of all claims which Owner might assert except those arising from: (1) unsettled claims; (2) faulty or defective work (3) failure of the work to comply with the requirements of the contract documents; (4) warranties required by this contract or that by their terms do not expire upon completion of the contract.
- 8.9.7 If, after Substantial Completion, Warranty Completion is delayed through no fault of Contractor, or by the issuance of change orders affecting Final Completion, Owner may, upon recommendation of the Project Representative, extend the contract time by a reasonable period and accept certified applications for further Progress Payments.
- 8.9.8 Upon completion of all requirements identified in ARTICLE 8 as "Final" the funds representing Final Payment shall be released to Contractor along with the Certificate of Final Completion. Upon issuance of Certificate of Final Completion all contract sums shall be accounted for to Contractor and shall be paid to Contractor. However, any and all applicable bonds shall not be released until after the Warranty Period.

8.10 TIME AND LIQUIDATED DAMAGES

- 8.10.1 The time permitted for construction of the work will run from issuance of Notice to Proceed through the dates for Substantial Completion as specified in Agreement between Owner and Contractor, unless a specific completion date is specified.
- 8.10.2 The term "day" as used in this contract shall mean "calendar day" unless specifically stated otherwise.
- 8.10.3 All warranty periods and obligations accruing to Contractor through completion of the work shall be considered to begin on the date of Substantial Completion, unless otherwise agreed to separately in writing by Owner and Contractor.
- 8.10.4 Contractor shall begin the work as soon as possible after the date identified in Notice to Proceed and shall prosecute the work expeditiously and with adequate labor and materials.
- 8.10.5 Liquidated damages will be applied in the amount set out in the Agreement.
- 8.10.6 Claims for extension of time will be considered only if they affect "critical path" items specifically identified in the detailed progress schedule or in any applicable Supplementary Conditions. Claims for extension of the contract time must be made in writing to Owner not more than twenty (20) days after the reason for requested extension appears.

ARTICLE 9 CHANGES IN THE WORK, CONTRACT PRICE, AND TIME

9.1 CHANGE ORDERS

- 9.1.1 Without invalidating this contract, Owner may, at any time, order additions, deletions, or revisions in the work. All such changes must be authorized by written change order. Upon receipt of a change order, Contractor shall proceed with the work in accordance with applicable requirements of the contract documents. If any change order entails an increase or decrease in the contract price or an extension or curtailment of the contract time, adjustment will be made as provided herein.
- 9.1.2 Extra work will be paid for either at a fixed price specified in the change order (using unit prices or a lump sum amount) or on a time and materials basis.
- 9.1.3 Project Representative may authorize minor changes, alterations or deviations in the work in accordance with ARTICLE 2. These changes shall be authorized by written Field Order to be included in a subsequent Change Order.
- 9.1.4 Any additional work performed by Contractor without a properly executed change order will not entitle Contractor to an increase in the contract amount or to an extension of the contract time, except in the case of emergency threatening life, safety or property.

9.2 ISSUANCE OF CHANGE ORDER

- 9.2.1 The contract sum constitutes the total compensation to Contractor for the work required by this contract. The contract price may be changed only by a properly executed change order. Any request for increase in the contract price shall be based upon written notice delivered to Project Representative within ten (10) days after the reason for the proposed increase appears. Change order proposals must be accompanied by all pertinent data and documentation, including a detailed estimate showing costs, quantities, unit prices and markups for overhead and profit.
- 9.2.2 Project Representative shall analyze Contractor's change order proposal and shall make a recommendation to Owner within a reasonable period of time. If Owner accepts the proposal, Project Representative shall prepare the change order for execution by Contractor and Owner.
- 9.2.3 The value of any work added or deleted by change order shall be determined by one of the following methods:
 - A. Application of unit prices set forth in the bid: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit.
 - B. Application of mutually accepted unit prices for work not covered by bid unit prices: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit.
 - C. Mutual acceptance of a lump sum: Contractor's lump sum proposal must include an itemized breakdown of all costs of Contractor, subcontractors and suppliers. Breakdowns shall show quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
 - D. At Owner's option, Contractor may be directed to proceed with additional work on a "time and materials" basis which may also stipulate a maximum "not to exceed" amount. Contractor will be required to maintain and submit detailed records showing all quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
- 9.2.4 When both additions and credits for related work or substitutions are involved in any one change, the allowance for overhead and profit shall be based on the net change. All related items within a proposal shall be considered as a single item for purposes of computing overhead and profit.
- 9.2.5 When Contractor is directed to proceed on a time and materials basis, costs of the work shall be submitted daily for approval by Project Representative and may only include:
 - Actual payroll costs for employees, as substantiated by certified payroll, in the direct employ of Contractor for the times actually utilized in prosecution of the additional work, including allowance for benefits which Contractor customarily provides its employees;
 - B. The actual substantiated cost to Contractor for all material and equipment incorporated into the work, including transportation and storage expenses;
 - C. The actual substantiated amounts of payments by Contractor to subcontractors for work performed by the subcontractors;
 - D. Any costs of special consultants to the extent authorized by Owner:
 - E. Substantiated equipment rental costs at reasonable market rates;
 - F. Additional supervision and travel costs reasonably related to the work performed;
 - G. Increased bond premiums:
 - H. Additional license fees, permits, or applicable taxes;

I. Minor incidental expenses such as telegrams and long distance telephone charges.

To these direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.

- 9.2.6 Unless specifically agreed to by Owner in writing, the cost of additional work shall not include any portion of Contractor's general overhead, nor any sum attributable to Contractor's prosecution and supervision of the principal work at the site, nor any overtime expense, unless specifically agreed to by Owner in writing. Contractor shall not be compensated for any casualty or other losses or expenses attributable to negligence of Contractor or any person in its employ or any subcontractor or supplier.
- 9.2.7 Payment to Contractor shall be made only for the actual quantities of work performed and accepted or materials furnished, in conformance with the contract or applicable change order. When the accepted quantities of work or materials vary from the quantities stated in the bid schedule, Contractor shall accept as payment in full, payment at the original contract unit prices for the quantities of work and materials furnished, completed and accepted; except as provided in the contract documents.

9.3 UNIT PRICES

- 9.3.1 When unit prices are used, and where the final quantity of a major contract item varies more than 25% above or below the bid quantity, either party to the contract may request an equitable adjustment in the contract unit price of that item. A major contract item is an item equal to 10% or more of the total contract.
- 9.3.2 When the final quantity of work is less than 75% of the bid quantity, the equitable adjustment shall be made for those units of work done and accepted, except that the total payment for the item shall not exceed 75% of the total amount bid for the item.
- 9.3.3 To determine unit prices for authorized changes or additions in the work that alter the quantity of work under a lump sum pay item, adjustment to the pay item will be determined by multiplying the added or deleted quantity by the quotient of the contract lump sum price and the estimated quantity shown on the original plans. Payment will be made under a new contract item established for that purpose. Adjustments will be made as a change order to the contract.
- 9.3.4 No allowance shall be made for any increased expenses, loss of expected reimbursement or loss of anticipated profits suffered or claimed, either directly from such alterations in quantities or indirectly from unbalanced allocations among the contract items by Contractor, or any other causes.

9.4 ALLOWABLE OVERHEAD AND PROFIT

- 9.4.1 When the value of change order work is determined by the lump sum method or by the time and materials method, the following definitions and percentages shall apply.
- 9.4.2 Direct costs are defined as the net cost to Contractor to accomplish a given change. Costs of bonds and insurance associated with the change shall be applied after addition of indirect costs.
- 9.4.3 Indirect costs are defined as general operational charges relating to the accomplishment of a given change, including but not limited to small tools, incidental job burdens and general office expense.
- 9.4.4 Overhead and Profit: Allowances for all indirect costs shall be identified as combined overhead and profit and shall not exceed the percentages in the following schedule:

A. Additive work:

- (1) Prime Contractor:
 - (a) 15% of the direct costs of own work in excess of \$1,000.00; 20% when the total value of own work is equal to or less than \$1,000.00.
 - (b) 8% of the direct costs of work performed by subcontractors not including subcontractor's overhead and profit.
 - (c) 8% of the direct costs of equipment.
- (2) Subcontractors: percentages represented in subsections (a) and (b) are a maximum percentage

- allowed regardless of the tier or number of subcontractor(s) performing the work:
- (a) 15% total of the work performed by subcontractors in excess of \$1,000.00; 20% total of the work performed by subcontractor equal to or less than \$1,000.00.
- (b) 8% of the direct costs of equipment.
- (3) In no case shall overhead and profit exceed 23% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work exceeds \$1,000.00. In no case shall overhead and profit exceed 28% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work is equal to or less than \$1,000.00.

B. Deductive work:

(1) Prime Contractor: 4% of the direct cost of deleted own work.

9.5 CONCEALED CONDITIONS

- 9.5.1 This ARTICLE applies only when concealed conditions substantially at variance with the conditions set forth in the contract documents are encountered and these conditions were not foreseeable by Contractor or reasonably inferable from information provided by Architect or Owner in the bidding documents.
- 9.5.2 If it is determined the Contractor could not predict the concealed conditions as set forth under ARTICLE 9.5.1, Owner may issue a change order for the performance of additional work required with an equitable adjustment in the contract sum. Contractor shall not begin work upon any concealed condition until Owner has approved a written change order

ARTICLE 10 TESTING AND CORRECTION OF WORK

10.1 TESTS AND INSPECTIONS

- 10.1.1 Contractor shall be responsible for securing permits and approvals from entities having jurisdiction over the work. Contractor will provide any special testing or inspections required by the contract documents. Contractor shall notify Owner 48 hours prior to performing testing. Contractor shall not cover work that requires testing, inspection or approval until such testing, inspection, or approval has been completed. Owner reserves the right to approve the testing agency.
- 10.1.2 Neither observation by Owner nor inspections, tests, or approvals by Owner or Owner's testing agency shall relieve Contractor from Contractor's obligation to perform the work in accordance with the contract documents.

10.2 UNCOVERING OF WORK

- 10.2.1 If any work is covered or buried contrary to contract requirements or Owner's written request, such work shall be uncovered at Owner's request for inspections, tests or approvals. Uncovering and recovering shall be at Contractor's expense, unless Contractor has given notice of intent to cover the work and Owner has not acted with reasonable promptness to provide any necessary tests, inspections or approvals.
- 10.2.2 If any work has been covered which Owner has not specifically requested to observe prior to covering, or if Owner considers it necessary or advisable that covered work be inspected or tested by others, then Contractor shall, at Owner's request, uncover, expose or otherwise make available for observation, inspection, or testing, that portion of the work as Owner may require. Contractor shall furnish all necessary labor, materials and equipment. If such work is found to be defective, Contractor shall bear all expenses, including compensation for any additional professional services and testing. If, however, the uncovered work is found not to be defective, Contractor shall be allowed an equitable adjustment in the contract price or the contract time. Only Contractor's direct costs attributable to the uncovering of work and its recovering shall be allowed.

10.3 DEFECTIVE WORK

- 10.3.1 All work not meeting the requirements of the contract documents shall be considered defective.
- 10.3.2 Contractor shall promptly correct or replace any defective work. Any and all costs associated with correction or replacement shall be borne by Contractor. Contractor shall also bear the expense of making good all

- work of others destroyed or damaged or required to be redone because of the correction or replacement of defective work.
- 10.3.3 If, after seven (7) days written notice to Contractor, Contractor fails to correct deficiencies or to provide Owner with an approved schedule for correcting defective work, Owner may, without prejudice to any other remedy it may have, make good deficiencies and deduct the cost thereof from the payment then or thereafter due Contractor. No extensions of time shall be allowed for correction of work that is defective.

ARTICLE 11 WARRANTIES

- 11.1 Contractor unconditionally warrants for a period of one year from issuance of the Certificate of Substantial Completion the usability and quality of all work, labor and materials incorporated into the project, unless otherwise provided in the contract documents. After the approval of Final Payment and prior to the expiration of one year after the date of Final Completion, any work found to be defective shall be remedied promptly by Contractor within fourteen (14) days of written notice without cost to Owner and in accordance with Owner's written instructions. Contractor shall either correct such defective work, or, if it has been rejected by Owner, remove it from the site and replace it with acceptable work. If Contractor does not promptly comply with the terms of Owner's instructions, Owner may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be deducted from Warranty Period Payment, unless the surety elects to remedy deficiency.
- 11.2 In addition to other warranties set forth in this contract and in accordance with requirements stated in the contract documents, Contractor shall obtain and transmit to Architect all warranties on material and equipment incorporated into the work and either provided by the supplier or otherwise required by the contract documents. Transmittal of warranties to Owner shall be a prerequisite of the Certificate of Final Completion.
- 11.3 All material and equipment installed by Contractor shall have a manufacturer's warranty for a period of one year, except as otherwise provided by the contract documents. The period of warranty shall begin on the date of Substantial Completion unless otherwise noted on the Certificate of Substantial Completion. This article does not limit any manufacturer's warranty which extends for a period of time longer than that specified as minimum in the contract documents.
- 11.4 If a warranty period in excess of one year on a particular item or part of the work is required by the contract documents, the longer warranty period shall govern warranty obligations of Contractor.
- 11.5 Owner may accept defective work or materials found during the warranty period instead of requiring correction or removal and replacement. If acceptance occurs prior to approval of final payment, a change order shall be issued to reduce the contract price. If acceptance occurs after approval of final payment, an appropriate amount shall be paid by Contractor to Owner.
- 11.6 The provisions of this ARTICLE shall not be construed as limiting the right of Owner to make a claim against Contractor for work not constructed in accordance with the contract documents. Where a defect attributable to Contractor's or subcontractor's materials or workmanship appears after expiration of the one-year warranty period, Owner shall notify Contractor of the appearance of damages due to defective work or materials and shall offer Contractor the right to replace or repair all defective work and other work using Contractor's forces. If Contractor fails to correct the work and any consequentially damaged work within a reasonable time, or if Contractor refuses to correct the work, Owner may correct the work utilizing Owner's own forces. Contractor shall pay Owner all costs attributable to correction of the defective work and any consequential damages occasioned by the defective work.
- 11.7 Should Owner and Contractor agree to delay completion of any items, the one-year warranty period for those items shall commence upon written acceptance of each item by Owner.

ARTICLE 12 CLAIMS AND LITIGATION

12.1 This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.

- 12.2 No controversy or claim arising out of this contract shall be subject to binding arbitration unless both Owner and Contractor agree in writing to submit the question to arbitration at the time when the controversy arises.
- 12.3 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be referred initially to Project Representative, who shall render a recommendation in writing to Owner within a reasonable time.
- During pendency of any claim arising out of this contract, Contractor shall carry on the work and maintain the Progress Schedule approved by Owner unless otherwise agreed by Contractor and Owner in writing. Should Contractor cease work, Contractor shall be in breach of this contract and Owner shall have the right to terminate the contract and to prosecute the work to completion with Owner's own forces or with a replacement Contractor. Contractor shall be responsible for any increase in costs to Owner above the contract price.
- 12.5 Contractor may make claims for additional costs only if the additional cost involved has occurred because of:
 - A. A change order issued by Owner, where the additional sum due Contractor set forth in the change order is in dispute.
 - B. An order by Owner to stop the work where Contractor was not at fault.
 - C. Concealed conditions as set out in ARTICLE 9.
 - D. Failure of payment by Owner pursuant to ARTICLE 3.
 - E. Additional costs or delays caused by separate contractors' or Owner's forces in accordance with ARTICLE 6.
- 12.6 Contractor shall not make a claim for additional costs where the basis of the claim lies in an oversight or mistake made by Contractor during the bidding process or by reason of negligent acts or omissions of Contractor or any mistake in judgment or improper selection of construction means, methods, sequences and materials during the course of construction.
- 12.7 If Contractor is entitled to make claim for an increase in the contract sum, Contractor shall deliver to Owner written notice of Contractor's intention to assert each claim within twenty (20) days after occurrence of each event giving rise to the claim. Contractor must give this notice of claim and specify the full extent and nature of the claim(s) to Owner before proceeding to execute the work upon which a claim might be asserted. No claim for additional costs or compensation shall be valid unless the prior twenty (20) day notice has been given. Adherence to this provision shall be strict. Any adjustment in the contract sum resulting from settlement of claims shall be authorized by change order.

ARTICLE 13 TERMINATION OF THE CONTRACT OR SUSPENSION OF THE WORK

13.1 TERMINATION BY OWNER

- 13.1.1 Owner shall have the right to terminate the contract if Contractor should file for bankruptcy, reorganization, otherwise be declared insolvent, or if Contractor makes a general assignment for the benefit of creditors. Exercise of these rights, where required by law, is contingent upon relief from the automatic stay provisions of the United States Bankruptcy Court or through other appropriate court order. This right of termination is in addition to the right of Owner to terminate for cause outlined below and other rights of termination as stated in the contract documents.
- 13.1.2 Termination for cause: If Contractor: (1) repeatedly refuses or fails to supply enough proper skilled workmen; or (2) fails to pay promptly all subcontractors, suppliers, or other parties as set out in the contract documents; or (3) fails to adhere in all respects to the provisions of Title 8, Chapter 30, of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract and all other pertinent statutes, ordinances or regulations or orders of any local, state, or federal authority concerning payment; or (4) allows insurance to lapse; or (5) if after seven (7) days written notice, without prejudice to any other remedy of Owner, Contractor fails to correct to Owner's satisfaction deficiencies in work that does not conform to the contract documents; or (6) allows a situation that creates a danger to person or property to arise. Where an emergency situation creating a danger to person or property arises, Owner may at its option terminate the contract and take possession of the site and any of Contractor's equipment and material necessary to complete an emergency response or hire a separate contractor to complete the

emergency response. Contractor shall be paid the contract rate for the material used and shall be paid for the use of Contractor's equipment at the price shown in the contract documents or at the rate for such equipment listed in <u>RENTAL RATE BLUE BOOK FOR CONSTRUCTION EQUIPMENT</u>, published by Machinery Information Division of K-III Directory Corporation, 1735 Technology Drive, Suite 410, San Jose, California 95110. If the rate for such equipment is not so listed, reliable sources will be used to determine a reasonable rate.

- 13.1.3 In the event of termination for cause, Owner shall have the right of set-off, from any payment due Contractor, of all expenses, costs, and damages including but not limited to all professional and legal expenses and attorneys' fees and costs or other additional expenditures necessary to complete the projects that are occasioned by the termination. In the event such amounts exceed the amount of payment withheld, Contractor shall be liable to Owner for such amounts. No payment shall be made to Contractor prior to determination that a balance is due Contractor after the amount of set-off is determined.
- 13.1.4 Owner may terminate this contract at any time for the convenience of Owner for any reason deemed by Owner to be in the best interest of Owner.
- 13.1.5 If this contract is terminated for convenience, Contractor will be directed to make all necessary preparations for closing out the project and for safeguarding Owner's materials and the work already completed. Contractor will be paid for all conforming work done to date and for all materials delivered to the site and already paid for by Contractor, together with all reasonable costs directly attributed to termination, including fixed overhead. Contractor shall be responsible for minimizing the extent of such expenses and shall **not** be paid for expenses which could have been reasonably avoided. On the date that notice of termination or suspension for convenience is issued, Contractor shall immediately take all actions necessary to stop orders of material, rental of equipment or premises, employment of persons on the project, and shipment of materials not yet delivered to the site. The notice of termination or suspension for convenience shall specify a date by which all steps necessary for termination shall be completed and by which Contractor shall have removed any unused material and all Contractor's equipment and forces. Contractor shall leave the premises in a clean and safe condition on or prior to the date specified in the notice. Owner shall certify that all termination procedures have been completed and that the premises have been turned over to the possession of Owner. Within fifteen (15) days after that certification by Owner, Contractor shall render to Owner a bill for all expenses incurred in termination and for all work done subsequent to the last progress payment. Owner shall pay Contractor all sums properly due, together with any retainage not necessary to cover apparently nonconforming work or other changes, within fifteen (15) working days after the bill has been received by Owner, provided that Owner has received releases for all liens.
- 13.1.6 If Contractor is terminated for cause or default on this contract, the performance bond surety shall commence performance within fourteen (14) days of the termination or default. If the surety does not arrange for or commence performance by that date, Owner shall have the option to complete or arrange for performance and the surety shall not be relieved of any responsibility for payment of costs of performance.
- 13.1.7 Should Owner elect to terminate Contractor's services prior to final completion of the work, such termination shall not affect any rights Owner might assert against Contractor at time of termination or thereafter. Any retention or payment of monies by Owner to Contractor shall not release Contractor from that liability.

13.2 SUSPENSION OF THE WORK

13.2.1 Owner may, at any time and for any reason, suspend the work or any portion of it for a period not to exceed ninety (90) days, by written notice delivered to Contractor thirty (30) days prior to the date fixed for suspension. The notice of suspension shall fix the date on which the work is to be resumed and Contractor shall resume the work on the date so fixed. Equitable adjustment in the contract price, the contract time, or both shall be made for cost or delay directly attributable to suspension of the work.

13.3 TERMINATION BY CONTRACTOR

13.3.1 If through no act or fault of Contractor, Owner orders a suspension of work for a period of more than ninety (90) days, Contractor may, upon thirty (30) days written notice to Owner, terminate this contract and recover from Owner payment for work accepted to date plus purported overhead and profit in the manner provided in ARTICLE 9.4. Contractor shall also have the right to terminate this contract if Owner fails within forty-

five (45) days to pay amounts properly due Contractor for satisfactorily accomplished work, so certified by Project Representative, as due and payable. The provisions of this section do not include amounts ordinarily retained from Contractor's Application for Payment or amounts retained because of unsatisfactory, defective, or incomplete work, or for any other reason provided in the contract documents.

ARTICLE 14 MISCELLANEOUS PROVISIONS

- 14.1 Whenever any provision of the contract documents requires written notice, such notice shall be deemed to have been given and binding when given by certified mail to the respective party at the address provided in the Legal Notice provision of the agreement section of the contract documents.
- 14.2 Neither party may assign this contract without the written consent of the other party and Contractor may not delegate duties under this contract other than as provided in the contract documents without the prior written consent of Owner.
- In the event a provision of the contract documents is found to be unenforceable or void for any reason, it shall be considered as severed from the contract documents, and the remaining portions of the contract documents shall stand as if that provision had never been included in the contract documents. In the event the unenforceable or void provision is legally essential to the continuing existence of the contract, the parties shall attempt to substitute a reasonable replacement provision.
- 14.4 No general condition stated in these provisions or other provision in the contract documents lessens, alters, or makes inapplicable the requirement for indemnification stated in ARTICLE 4.13.

 In the event of conflict between any contract provisions, the requirements set out in ARTICLE 4.13 control.

END GENERAL CONDITIONS

PERFORMANCE BOND

(Name of Contractor)
(Address of Contractor)
, hereinafter called Principal, and (Corporation, Partnership, or Individual)
(Name of Surety)
(Address of Surety)
ereinafter called Surety, are held and firmly bound unto
(Name of Owner)
(Address of Owner)
pereinafter called Owner, in the penal sum of
HE CONDITIONS OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract wine Owner, dated the day of, 202_, a copy of which is hereto attached and made a page ereof for the construction of:
enai Vintage Point Housing Boiler & Controls Replacement

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the 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 he 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 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 thereunder or the specifications accompanying the same shall in any ways 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 to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

IN WITNESS WHEREOF, this instrume	ent is executed in three (3) counterparts, each or	ne of which shall be deemed
an original, this the day of	, 202	
	(Principal)	(SEAL)
	(Principal Secretary)	
ATTEST:	BY	
(Witness as to Principal)	(Address)	····
(Address)		
	(Surety)	(SEAL)
ATTEST:	BY(Attorney-in-Fact)	
(Witness as to Surety)	(Address)	
(Address)		
NOTE: If Contractor is Partnership, all	partners should execute bond.	
IMPORTANT: Surety companies executin	ng bonds must appear on the Treasury Department's m	nost current list (Circular 570 as

PAYMENT BOND

NOW ALL MEN BY THESE PRESENTS: that
(Name of Contractor)
(Address of Contractor)
, hereinafter called Principal, and Corporation, Partnership, or Individual)
(Name of Surety)
(Address of Surety) ereinafter called Surety, are held and firmly bound unto
(Name of Owner)
(Address of Owner)
Dollars, in the penal sum of Dollars, in lawful money of the United States, for the payment of which sum well and truly be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly these presents.
HE CONDITIONS OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with e Owner, dated the day of, 202_, a copy of which is hereto attached and made a part ereof for the construction of:
enai Vintage Point Housing Roiler & Controls 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 said work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or other-wise, 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 thereunder or the specifications accompanying the same shall in any ways 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 to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

	nstrument is executed in three (3) counterparts, ea	ach one of which shall be deemed
an original, this the day	or, 202	
	(Principal)	(SEAL)
	(Principal Secretary)	
ATTEST:	BY	
(Witness as to Principal)	(Address)	
(Address)		
	(Surety)	(SEAL)
ATTEST:	BY(Attorney-in-Fa	act)
(Witness as to Surety)	(Address)	
(Address)		
NOTE: If Contractor is Partner	ship, all partners should execute bond.	
IMPORTANT: Surety companies	s executing bonds must appear on the Treasury Departm	ent's most current list (Circular 570 as

CONTRACTOR'S RELEASE AND AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS ("Release")

PROJECT NAME: Kenai Vintage Point Housing Boiler & Controls Replacement

The undersigned, being first duly sworn, deposes and says:
1. That pursuant to this contract for project
2. The Contractor further certifies he did not extend any loan, gratuity, or gift of money of an form whatsoever to any employee or agent of the City, that he did not rent or purchase an equipment or materials from any employee of the City, nor to the best of his knowledge, from an agent of any employee of the City, and that he has not made any promise to an employee of agent of the City to do or undertake any such action after completion of the subject contract.
3. Pursuant to the above-described contract and in consideration of the final payment in the amount of \$, the undersigned Contractor hereby releases and discharges the City of Kenai, its officers, agents and employees of and from any and all further claim, deby charge, demand, liability, or other obligation whatsoever under or arising from said contract whether known or unknown and whether or not ascertainable at the time of the execution of this instrument. This release is complete, final, binding and irrevocable.
4. The Contractor shall indemnify, defend, save and hold the City, its elected and appointed officers, agents and employees, harmless from any and all claims, demands, suits, or liability of any nature, kind or character including costs, expenses, and attorneys fees resulting from Contractor or Contractor's officers, agents, employees, partners, attorneys, suppliers, and subcontractors' performance or failure to perform this Agreement in any way whatsoever. This defense and indemnification responsibility includes claims alleging acts or omissions by the City or its agents which are said to have contributed to the losses, failure, violations, or damage However, Contractor shall not be responsible for any damages or claim arising from the solve negligence or willful misconduct of the City, its agents, or employees. Contractor and subcontractors shall also not be required to defend or indemnify the City for damage or loss that has been found to be attributed to an independent contractor directly responsible to the City undeseparate written contract.

CONTRACTOR'S RELEASE AND AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS ("Release")

If any portion of this Release is voided by law or court of competent jurisdiction, the remainder of this Release shall remain in full force and effect. IN WITNESS WHEREOF, this Release has been executed this __day of ______, 2023. (Contractor's signature) Title **ACKNOWLEDGMENT** STATE OF ALASKA SS THIRD JUDICIAL DISTRICT THIS IS TO CERTIFY that on this day of , 2023, before the undersigned, a Notary Public in and for the State of Alaska, duly commissioned and sworn, personally appeared ______, who, having produced satisfactory evidence of identification, and having acknowledged the voluntary and authorized execution of the foregoing instrument for the purposes therein mentioned, executed the above and foregoing instrument. Notary Public for Alaska My Commission Expires: _____

(NOTE: In case of a corporation, the attached Certificate of Authority must be completed by a

corporate officer other than the one who signs above.)



CONSENT OF SURETY COMPANY TO FINAL PAYMENT

PRO		
CON	NTRACT DATE:	
CON	NTRACTOR:	
TO:	CITY OF KENAI, OWNER 210 Fidalgo Avenue Kenai, AK 99611 Attn: Public Works Department	
	cecordance with the provisions of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor, Surety (insert name and address of the above-referenced Genai, and Contractor).	
	s hereby consent to and approve of the final payment to, and in the case of Surety, it is further agree	
repres	In giving this Consent, Surety has made its own inverther said payment should be made to Contractor and Suresentation by the City of Kenai or its employees or agent to such payment.	rety has not relied on any
2.	Surety agrees that this payment shall not relieve Sure	ety of any of its obligations to

the City of Kenai as set forth in its Labor and Material Payment and Performance Bonds

and Surety waives any and all claims against Coto Contractor.	ity of Kenai for wrongful release of funds
IN WITNESS WHEREOF, said Surety Comparation, 20	ny has set its hand this day of
	(Surety)
	(Signature of authorized representative)
	(Printed name and title)
ACKNOWI	LEDGMENT
STATE OF	
THIS IS TO CERTIFY that on the, Title:	day of, 20,
(Surety), being personally known to me or identification, appeared before me and acknowled of the foregoing instrument.	having produced satisfactory evidence of
	Notary Public for
	Notary Public for My Commission Expires:

NOTE TO SURETY: ATTACH PROOF OF POWER OF ATTORNEY OR OTHER DOCUMENTATION DEMOSTRATING SIGNATORY MAY BIND SURETY.

SAMPLE

Alaska Department of Commerce, Community, and Economic Development P.O. Box 110806, Juneau, Alaska 99811-0806

ALASKA BUSINESS LICENSE

The licensee named below holds Alask	a Business License Number	
Covering the period of:	through	
Line of Business:	·	

COMPANY NAME

ADDRESS

Owner: NAME OF OWNER

This license shall not be taken as permission to do business in the state without having complied with The other requirements of the laws of the State of Alaska or of the United States.

Alaska Department of Commerce, Community, and Economic Development Commissioner:

This license must be posted in a conspicuous place at the business location. It is not transferable or assignable.

		SAMPLE
No Effective: Expires:	STATE OF ALASKA DEPARTMENT OF COMMERCE, COMMUNITY & ECONOMIC DEVELOPMENT Division of Occupational Licensing	
	Division of Occupational Licensing	
	Certifies that	
	COMPANY NAME	
	Is a Registered	
	Specialty Commissioner:	



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(les) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy certain policies may require an endorsement. A statement on this certificate does not confer rights to the

PRODUCER		CONTACT NAME:	312				
		PHONE (A/C, No. Ext):	FAX (A/C, No):	ic			
		E-MAIL ADDRESS:					
		INSURER(S) AFFORDING COVERAGE					
		INSURER A 2					
INSURED		INSURER B:					
		INSURER C:					
		INSURER D:					
		INSURER E :					
		INSURER F:					
COVERAGES	CERTIFICATE NUMBER:		REVISION NUMBER:				
INDICATED, NOTWITH	HAT THE POLICIES OF INSURANCE LISTED BELOW STANDING ANY REQUIREMENT, TERM OR CONDITI ISSUED OR MAY PERTAIN, THE INSURANCE AFFO	ON OF ANY CONTRACT OR OTHE	ER DOCUMENT WITH RESPECT TO	WHICH THIS			

EXCLUSIONS AND CONDITIONS OF SUCH POLICIES, LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSF	TYPE OF INSURANCE	ADD	SUBR		POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMIT	s	
(GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY							EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence)	\$	1,000,000
A	SEAMS MADE IN OCCUR	х	х	7				MED EXP (Any one person)	\$	5,000
			+-					PERSONAL & ADV INJURY	\$	1,000,000
								GENERAL AGGREGATE	\$	2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:							PRODUCTS - COMP/OP AGG	\$	2,000,000
	X POLICY PRO-								5	
	AUTOMOBILE LIABILITY							COMBINED SINGLE LIMIT (Ea accident)	\$	1,000,000
A	X ANY AUTO					BODILY INJURY (Per person)	\$	<u> </u>		
12	ALL OWNED SCHEDULED AUTOS	X	x x				BODILY INJURY (Per accident)	\$		
	HIRED AUTOS NON-OWNED AUTOS	-	-				PROPERTY DAMAGE (Per accident)	\$		
								Underinsured motorist	\$	1,000,000
	X UMBRELLA LIAB OCCUR							EACH OCCURRENCE	\$	
A	EXCESS LIAB CLAIMS-MADE							AGGREGATE	\$	4,000,000
	DED TRETENTIONS 10,000				1704-170 July 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 - 190 -				\$	
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			1000000				X WC STATU- OTH-		
	ANY PROPRIETO DOWN THERVEXECUTIVE TO OFFICER/MEMBER EXCLUDED? (Mandadory in NH)			E.L. EACH ACCIDENT	\$	1,000,000				
			pa		E.L. DISEASE - EA EMPLOYEE	\$	1,000,000			
	If yes, describe under DESCRIPTION OF OPERATIONS below		X					E.L. DISEASE - POLICY LIMIT	\$	1,000,000

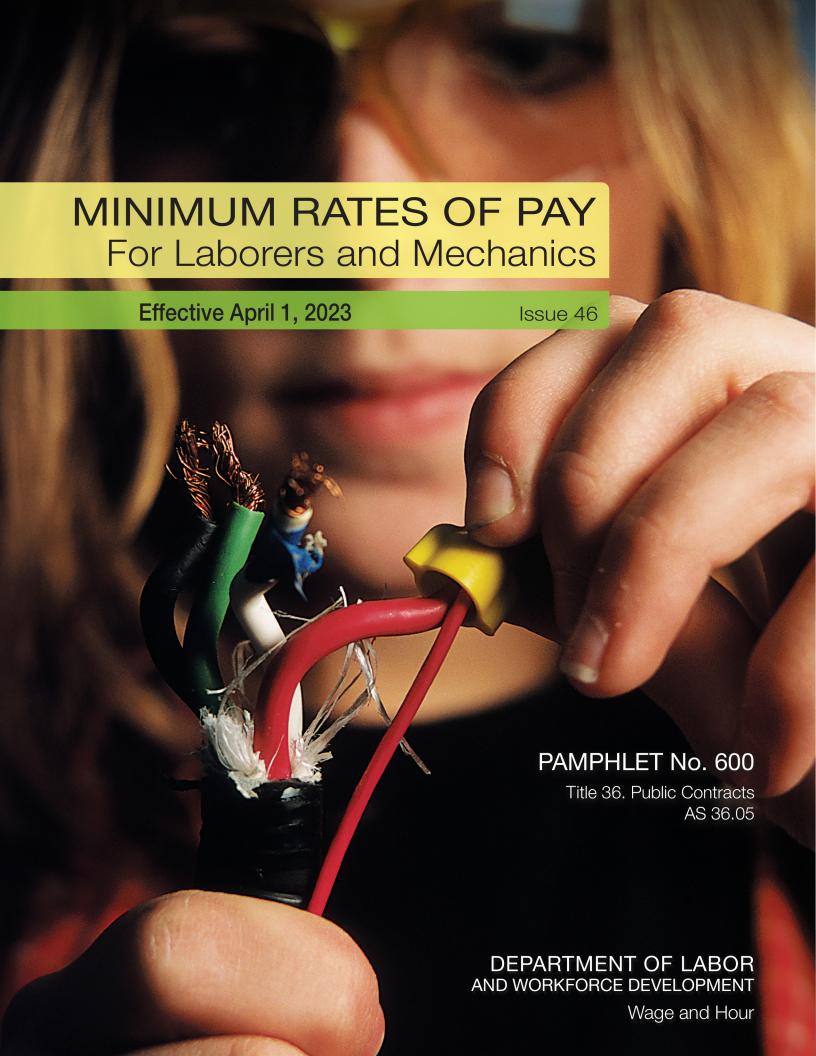
DESCRIPTION OF OPERATIONS (LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Re: PROJECT NAME

Certificate Holder is an Additional Insured on General Liability & Automobile policies, but only with respect to work done by or on behalf or the named insured for the project referenced. The Certificate Holder is granted Waiver of Subrogation on the General Liability, Automobile and Workers' Compensation policies as respects the referenced project

CERTIFICATE HOLDER	CANCELLATION
City of Kenai	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
210 Fidalgo Ave Kenai, AK 99611	AUTHORIZED REPRESENTATIVE

ACORD 25 (2010/05)







Department of Labor and Workforce Development

Office of the Commissioner

Post Office Box 111149 Juneau, Alaska 99811 Main: 907.465.2700 fax: 907.465-2784

April 1, 2023

TO ALL CONTRACTING AGENCIES:

At the Alaska Department of Labor and Workforce Development our goal is putting Alaskans to work. This pamphlet is designed to help contractors awarded public construction contracts understand the most significant laws of the State of Alaska pertaining to prevailing wage.

This pamphlet identifies current prevailing wage rates for public construction contracts (any construction projects awarded for the State of Alaska or its political subdivisions, such as local governments and certain non-profit organizations). Because these rates may change in a subsequent determination, please be sure you are using the appropriate rates. The rates published in this edition become effective April 1, 2023.

The prevailing wage rates contained in this pamphlet are applicable to public construction projects with a final bid date of April 11, 2023, or later. As the law now provides, these rates will remain stable during the life of a contract or for 24 calendar months, whichever is shorter. **The 24-month period begins on the date the prime contract is awarded.** Upon expiration of the initial 24-month period, the <u>latest</u> wage rates issued by the department shall become effective for a subsequent 24-month period or until the original contract is completed, whichever occurs first. This process shall be repeated until the original contract is completed.

The term "original contract" means the signed contract that resulted from the original bid and any amendments, including changes of work scope, additions, extensions, change orders, and other instruments agreed to by the parties that have not been subject to subsequent open bid procedures.

If a higher federal rate is required due to partial federal funding or other federal participation, the higher rate must be paid.

For additional copies of this pamphlet go to: http://labor.state.ak.us/lss/pamp600.htm

For questions regarding prevailing wage or employment preference requirements, please contact the nearest Wage and Hour office. These offices are listed on Page x.

Sincerely,

Catherine Muñoz Acting Commissioner

To the wine Muinz

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Note to Readers: The statutes and administrative regulations listed in this publication were taken from the official codes, as of the effective date of the publication. However, there may be errors or omissions that have not been identified and changes that occurred after the publication was printed. This publication is intended as an informational guide only and is not intended to serve as a precise statement of the statutes and regulations of the State of Alaska. To be certain of current laws and regulations, please refer to the official codes.

EXCERPTS FROM ALASKA LAW

Sec. 36.05.005. Applicability.

This chapter applies only to a public construction contract that exceeds \$25,000.

Sec. 36.05.010. Wage rates on public construction.

A contractor or subcontractor who performs work on a public construction contract in the state shall pay not less than the current prevailing rate of wages for work of a similar nature in the region in which the work is done. The current prevailing rate of wages is that contained in the latest determination of prevailing rate of wages issued by the Department of Labor and Workforce Development at least 10 days before the final date for submission of bids for the contract. The rate shall remain in effect for the life of the contract or for 24 calendar months, whichever is shorter. At the end of the initial 24-month period, if new wage determinations have been issued by the department, the latest wage determination shall become effective for the next 24-month period or until the contract is completed, whichever occurs first. This process shall be repeated until the contract is completed.

Sec. 36.05.040. Filing schedule of employees, wages paid, and other information.

All contractors or subcontractors who perform work on a public construction contract for the state or for a political subdivision of the state shall, before the Friday of every second week, file with the Department of Labor and Workforce Development a sworn affidavit for the previous reporting period, setting out in detail the number of persons employed, wages paid, job classification of each employee, hours worked each day and week, and other information on a form provided by the Department of Labor and Workforce Development.

Sec. 36.05.045. Notice of work and completion; withholding of payment.

- (a) Before commencing work on a public construction contract, the person entering into the contract with a contracting agency shall designate a primary contractor for purposes of this section. Before work commences, the primary contractor shall file a notice of work with the Department of Labor and Workforce Development. The notice of work must list work to be performed under the public construction contract by each contractor who will perform any portion of work on the contract and the contract price being paid to each contractor. The primary contractor shall pay all filing fees for each contractor performing work on the contract, including a filing fee based on the contract price being paid for work performed by the primary contractor's employees. The filing fee payable shall be the sum of all fees calculated for each contractor. The filing fee shall be one percent of each contractor's contract price. The total filing fee payable by the primary contractor under this subsection may not exceed \$5,000. In this subsection, "contractor" means an employer who is using employees to perform work on the public construction contract under the contract or a subcontract.
- (b) Upon completion of all work on the public construction contract, the primary contractor shall file with the Department of Labor and Workforce Development a notice of completion together with payment of any additional filing fees owed due to increased contract amounts. Within 30 days after the department's receipt of the primary contractor's notice of completion, the department shall inform the contracting agency of the amount, if any, to be withheld from the final payment.
- (c) A contracting agency
 - (1) may release final payment of a public construction contract to the extent that the agency has received verification from the Department of Labor and Workforce Development that
 - (A) the primary contractor has complied with (a) and (b) of this section;
 - (B) the Department of Labor and Workforce Development is not conducting an investigation under this title; and
 - (C) the Department of Labor and Workforce Development has not issued a notice of a violation of this chapter to the primary contractor or any other contractors working on the public construction contract; and

- (2) shall withhold from the final payment an amount sufficient to pay the department's estimate of what may be needed to compensate the employees of any contractors under investigation on this construction contract, and any unpaid filing fees.
- (d) The notice and filing fee required under (a) of this section may be filed after work has begun if
 - (1) The public construction contract is for work undertaken in immediate response to an emergency; and
 - (2) The notice and fees are filed not later than 14 days after the work has begun.
- (e) A false statement made on a notice required by this section is punishable under AS 11.56.210.

Sec. 36.05.060. Penalty for violation of this chapter.

A contractor who violates this chapter is guilty of a misdemeanor and upon conviction is punishable by a fine of not less than \$100 nor more than \$1,000, or by imprisonment for not less than 10 days nor more than 90 days, or by both. Each day a violation exists constitutes a separate offense.

Sec. 36.05.070. Wage rates in specifications and contracts for public works.

- (a) The advertised specifications for a public construction contract that requires or involves the employment of mechanics, laborers, or field surveyors must contain a provision stating the minimum wages to be paid various classes of laborers, mechanics, or field surveyors and that the rate of wages shall be adjusted to the wage rate under <u>AS 36.05.010</u>.
- (b) Repealed by §17 ch 142 SLA 1972.
- (c) A public construction contract under (a) of this section must contain provisions that
 - (1) the contractor or subcontractors of the contractor shall pay all employees unconditionally and not less than once a week;
 - (2) wages may not be less than those stated in the advertised specifications, regardless of the contractual relationship between the contractor or subcontractors and laborers, mechanics, or field surveyors;
 - (3) the scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work;
 - (4) the state or a political subdivision shall withhold so much of the accrued payments as is necessary to pay to laborers, mechanics, or field surveyors employed by the contractor or subcontractors the difference between
 - (A) the rates of wages required by the contract to be paid laborers, mechanics, or field surveyors on the work; and
 - (B) the rates of wages in fact received by laborers, mechanics, or field surveyors.

Sec. 36.05.080. Failure to pay agreed wages.

Every contract within the scope of AS 36.05.070 shall contain a provision that if it is found that a laborer, mechanic, or field surveyor employed by the contractor or subcontractor has been or is being paid a rate of wages less than the rate of wages required by the contract to be paid, the state or its political subdivision may, by written notice to the contractor, terminate the contractor's right to proceed with the work or the part of the work for which there is a failure to pay the required wages and to prosecute the work to completion by contract or otherwise, and the contractor and the contractor's sureties are liable to the state or its political subdivision for excess costs for completing the work.

Sec. 36.05.090. Payment of wages from withheld payments and listing contractors who violate contracts.

- (a) The state disbursing officer in the case of a state public construction contract and the local fiscal officer in the case of a political subdivision public construction contract shall pay directly to laborers, mechanics, or field surveyors from accrued payments withheld under the terms of the contract the wages due laborers, mechanics, or field surveyors under <u>AS 36.05.070.</u>
- (b) The state disbursing officer or the local fiscal officer shall distribute to all departments of the state government and to all political subdivisions of the state a list giving the names of persons who have disregarded their obligations to employees. A person appearing on this list and a firm, corporation, partnership, or association in which the person has an interest may not work as a contractor or

subcontractor on a public construction contract for the state or a political subdivision of the state until three years after the date of publication of the list. If the accrued payments withheld under the contract are insufficient to reimburse all the laborers, mechanics, or field surveyors with respect to whom there has been a failure to pay the wages required under AS 36.05.070, the laborers, mechanics, or field surveyors have the right of action or intervention or both against the contractor and the contractor's sureties conferred by law upon persons furnishing labor or materials, and in the proceedings it is not a defense that the laborers, mechanics, or field surveyors accepted or agreed to accept less than the required rate of wages or voluntarily made refunds.

Sec. 36.05.900. Definition.

In this chapter, "contracting agency" means the state or a political subdivision of the state that has entered into a public construction contract with a contractor.

EXCERPTS FROM ALASKA ADMINISTRATIVE CODE

Notice: Regulations relating to board and lodging and per diem went into effect on November 25, 2018. The new regulations are excerpted here

- **8 AAC 30.051. Purpose.** The purpose of 8 AAC 30.052 8 AAC 30.056 is to ensure that wages paid to laborers, mechanics, and field surveyors do not fall below the prevailing rate of pay.
- **8 AAC 30.052. Board and lodging; remote sites.** (a) A contractor on a public construction project located 65 or more road miles from the international airport closest to the project area in either Fairbanks, Juneau, or Anchorage, or that is inaccessible by road in a two-wheel drive vehicle, shall provide adequate board and lodging to each laborer, mechanic, or field surveyor while the person is employed on the project. If commercial lodging facilities are not available, the contractor shall provide temporary lodging facilities. Lodging facilities must comply with all applicable state and federal laws. For a highway project, the location of the project is measured from the midpoint of the project.
- (b) A contractor is not required to provide board and lodging:
 - (1) to a laborer, mechanic, or field surveyor who is a domiciled resident of the project area; or
 - (2) on a laborer, mechanic, or field surveyor's scheduled days off, when the person can reasonably travel between the project and the person's permanent residence; for the purposes of this paragraph, "scheduled day off" means a day in which a person does not perform work on-site, is not required to remain at or near the job location for the benefit of the contractor, and is informed of the day off at least seven days before the day off.
- (c) Upon a contractor's written request, the commissioner may waive the requirements of (a) of this section where:
 - (1) the project is inaccessible by road in a two-wheel drive vehicle, but the laborer, mechanic, or field surveyor can reasonably travel between the project and the person's permanent residence within one hour; or
 - (2) a laborer, mechanic, or field surveyor is not a domiciled resident of the project area, but has established permanent residence, with the intent to remain indefinitely, within 65 road miles of the project, or for a highway project, the mid-point of the project.
- **8 AAC 30.054. Per diem instead of board and lodging.** (a) A contractor may pay a laborer, mechanic, or field surveyor per diem instead of providing board and lodging, when the following conditions are met:
 - (1) the department determines that per diem instead of board and lodging is an established practice for the work classification; the department shall publish and periodically revise its determinations in the pamphlet *Laborers and Mechanics Minimum Rates of Pay*;
 - (2) the contractor pays each laborer, mechanic, or field surveyor the appropriate per diem rate as published and periodically revised in the pamphlet *Laborers and Mechanics Minimum Rates of Pay*; and

- (3) the contractor pays the per diem to each laborer, mechanic, or field surveyor on the same day that wages are paid.
- (b) A contractor may not pay per diem instead of board and lodging on a highway project located
 - (1) west of Livengood on the Elliot Highway, AK-2;
 - (2) on the Dalton Highway, AK-11;
 - (3) north of milepost 20 on the Taylor Highway, AK-5;
 - (4) east of Chicken on the Top of the World Highway; or
 - (5) south of Tetlin Junction to the Alaska-Canada border on the Alaska Highway, AK-2.

8 AAC 30.056. Alternative arrangement. Upon a contractor's written request, the commissioner may approve an alternative board and lodging or per diem arrangement, provided

- (1) the arrangement does not reduce the laborer, mechanic, or field surveyor's wages below the prevailing wage rate; and
- (2) the laborer, mechanic, or field surveyor voluntarily enters into and signs the written arrangement; a labor organization representing laborers, mechanics, or field surveyors may enter into the written agreement on their behalf.

8 AAC 30.900. General definitions (selected excerpts only):

In this chapter and in AS 36

- (22) "domiciled resident" means a person living within 65 road miles of a public construction project, or in the case of a highway project, the mid-point of the project, for at least 12 consecutive months prior to the award of the public construction project;
- (23) "employed on the project" means the time period from the date the laborer, mechanic, or field surveyor first reports on-site to the project through the final date the person reports on-site to the project.

ADDITIONAL INFORMATION

PER DIEM

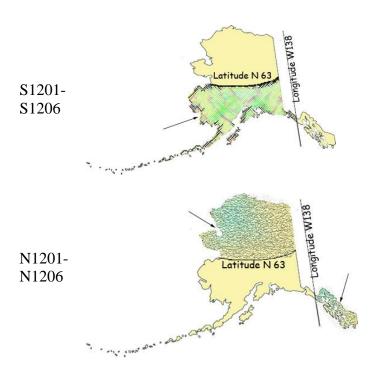
Notice: New regulations relating to board and lodging and per diem went into effect on November 25, 2018. The regulations provide a comprehensive set of requirements for the provision of board and lodging or per diem for workers on remote projects. Please refer to Alaska Administrative Code 8 AAC Chapter 30 and read the chapter carefully.

The Alaska Department of Labor and Workforce Development has determined that per diem is an established work practice for certain work classifications. These classifications are indicated throughout the Pamphlet by an asterisk (*) under the classification title. If all of the conditions of 8 AAC 30.054 are met, an employer may pay workers in these classifications per diem instead of providing board and lodging on a remote project.

Per Diem Rate: As of May 1st, 2019, the minimum per diem rate is \$100.00 per day, or part thereof, the worker is employed on the project. In the event that a contractor provides lodging facilities, but no meals, the department will accept a payment of \$48 per day for meals to meet the per diem requirements.

LABORER CLASSIFICATION CLARIFICATION

The laborer rates categorized in class code S1201-S1206 apply in one area of Alaska; the area that is south of N63 latitude and west of W138 Longitude. The laborer rates categorized in class code N1201-N1206 apply in two areas of Alaska; the Alaska areas north of N63 latitude and east of W138 longitude. The following graphic representations should assist with clarifying the applicable wage rate categories:



APPRENTICE RATES

Apprentice rates at less than the minimum prevailing rates may be paid to apprentices according to an apprentice program which has been registered and approved by the Commissioner of the Alaska Department of Labor and Workforce Development in writing or according to a bona fide apprenticeship program registered with the U.S. Department of Labor, Office of Apprenticeship Training. **Any employee listed on a payroll at an apprentice wage rate who is not registered as above shall be paid the journeyman prevailing minimum wage in that work classification.** Wage rates are based on prevailing crew makeup practices in Alaska and apply to work performed regardless of either the quality of the work performed by the employee or the titles or classifications which may be assigned to individual employees.

FRINGE BENEFIT PLANS

Contractors/subcontractors may compensate fringe benefits to their employees in any one of three methods. The fringe benefits may be paid into a union trust fund, into an approved benefit plan, or paid directly on the paycheck as gross wages.

Where fringe benefits are paid into approved plans, funds, or programs including union trust funds, the payments must be contributed at least monthly. If contractors submit their own payroll forms and are paying fringe benefits into approved plans, funds, or programs, the employer's certification must include, in addition to those requirements of <u>8 AAC 30.020(c)</u>, a statement that fringe benefit payments have been or will be paid at least monthly. Contractors who pay fringe benefits to a plan must ensure the plan is one approved by the Internal Revenue Service and that the plan meets the requirements of <u>8 AAC 30.025</u> (eff. 3/2/08) in order for payments to be credited toward the prevailing wage obligation.

SPECIAL PREVAILING WAGE RATE DETERMINATION

Special prevailing wage rate determinations may be requested for special projects or a special worker classification if the work to be performed does not conform to traditional public construction for which a prevailing wage rate has been established under <u>8 AAC 30.050(a)</u> of this section. Requests for special wage rate determinations must be in writing and filed with the Commissioner <u>at least 30 days before the award of the contract</u>. An applicant for a special wage rate determination shall have the responsibility to support the necessity for the special rate. An application for a special wage rate determination filed under this section must contain:

- (1) a specification of the contract or project on which the special rates will apply and a description of the work to be performed;
- (2) a brief narrative explaining why special wage rates are necessary;
- (3) the job class or classes involved;
- (4) the special wage rates the applicant is requesting, including survey or other relevant wage data to support the requested rates;
- (5) the approximate number of employees who would be affected; and
- (6) any other information which might be helpful in determining if special wage rates are appropriate.

Requests made pursuant to the above should be addressed to:

Director
Alaska Department of Labor and Workforce Development
Labor Standards and Safety Division
Wage and Hour
P.O. Box 111149
Juneau, AK 99811-1149

Email: statewide.wagehour@alaska.gov

EMPLOYMENT PREFERENCE INFORMATION

In October 2019, the Alaska Attorney General issued a formal opinion stating that the Alaska Statutes 36.10.150 of the State's 90% Employment Preference law, also known as the Alaska Resident Hire law, violates both the U.S. and Alaska Constitutions. As a result, the state has stopped all enforcement activity. A copy of the Attorney General opinion is found here:

http://law.alaska.gov/pdf/opinions/opinions 2019/19-005 AK-hire.pdf

Alaska Department of Labor and Workforce Development Labor Standards and Safety Division Wage and Hour

Web site: http://labor.state.ak.us/lss/pamp600.htm

Anchorage	Juneau	Fairbanks
1251 Muldoon Road, Suite 113	PO Box 111149	Regional State Office Building
Anchorage, Alaska 99504-2098	Juneau, Alaska 99811	675 7 th Ave., Station J-1
Phone: (907) 269-4900	Phone: (907) 465-4842	Fairbanks, Alaska 99701-4593
		Phone: (907) 451-2886
Email:	Email:	Email:
statewide.wagehour@alaska.gov	statewide.wagehour@alaska.gov	statewide.wagehour@alaska.gov

LABOR STANDARDS AND SAFETY NOTICE REQUESTS

If you would like to receive Wage and Hour or Mechanical Inspection **regulation notices** or **publications information**, they are available via electronic mail, by signing up in the GovDelivery System, https://public.govdelivery.com/accounts/AKDOL/subscriber/new and selecting topics LSS – Wage and Hour – Forms and Publications, LSS – Mechanical Inspection Regulations, or LSS – Wage and Hour Regulations.

Publications are also available online at http://labor.alaska.gov/lss/home.htm

DEBARMENT LIST

<u>AS 36.05.090(b)</u> states that "the state disbursing officer or the local fiscal officer shall distribute to all departments of the state government and to all political subdivisions of the state a list giving the names of persons who have disregarded their obligations to employees."

A person appearing on the following debarment list and a firm, corporation, partnership, or association in which the person has an interest may not work as a contractor or subcontractor on a public construction contract for the state or a political subdivision of the state for three years from the date of debarment.

<u>Company Name</u> <u>Debarment Expires</u>

No companies are currently debarred.

Laborers' & Mechanics' Minimum Rates of Pay

Class Code	Classification of Laborers & Mechanics	BHR H&W	PEN	TRN	Other I	Benefits	THR
<mark>Boilern</mark>	nakers						
* (See per diem note on last page						
A0101	Boilermaker (journeyman)	48.15 8.57	18.40	2.15	VAC 4.25	SAF 0.34	81.86
Brickla	yers & Blocklayers						
* (See per diem note on last page						
A0201	Blocklayer	42.01 9.00	10.20	0.62	L&M 0.20		62.03
	Bricklayer Marble or Stone Mason Refractory Worker (Firebrick, Plastic, Castable, and Gunite Refractory Applications) Terrazzo Worker Tile Setter						
A 0.2.02 "	Tuck Pointer Caulker	42.01 9.00	10.20	0.62	L&M 0.20		62.03
	Cleaner (PCC)				L&M		
A0203	Marble & Tile Finisher	35.84 9.00	10.20	0.62	0.20		55.86
	Terrazzo Finisher Torginal Applicator	35.84 9.00	10.20	0.62	L&M 0.20		55.86
Carnen	ters, Region I (North of 63 latitude)						
_	See per diem note on last page						
N0301	Carpenter (journeyman)	43.34 10.35	15.82	1.75	L&M 0.20	SAF 0.20	71.66
	Lather/Drywall/Acoustical						
-	See per diem note on last page						
S0301	Carpenter (journeyman)	43.34 10.35	16.36	1.75	L&M 0.20	SAF 0.20	72.20
	Lather/Drywall/Acoustical						
	t Masons See per diem note on last page						

Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement fund; LEG=legal fund; L&M=labor/management fund; PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=total hourly rate; VAC=vacation

Class Code	Classification of Laborers & Mechanics	BHR H	&W]	PEN_	TRN	Other Bene	fits THR
Cemer	nt Masons						
*	See per diem note on last page						
						L&M	
A0401	Group I, including:	44.43 8	.80	11.80	1.53	0.10	66.66
	Application of Sealing Compound						
	Application of Underlayment						
	Building, General						
	Cement Finisher						
	Cement Mason (journeyman)						
	Concrete						
	Concrete Paving						
	Concrete Polishing						
	Concrete Repair						
	Curb & Gutter, Sidewalk						
	Curing of All Concrete						
	General Concrete Pour Tender						
	Grouting & Caulking of Tilt-Up Panels						
	Grouting of All Plates						
	Patching Concrete						
	Screed Pin Setter						
	Screeder or Rodder						
	Spackling/Skim Coating						
						L&M	
A0402	Group II, including:	44.43 8	.80	11.80	1.53	0.10	66.66
	Form Setter						
	2 0.111 2 0.111					L&M	
A0403	Group III, including:	44.43 8	.80	11.80	1.53	0.10	66.66
	Comments Compared to College Comments (All Control Lines and College Comments)						
	Concrete Saw Cutter Operator (All Control Joints and Self-powered) Curb & Gutter Machine						
	Floor Grinder						
	Pneumatic Power Tools						
	Power Chipping & Bushing						
	Sand Blasting Architectural Finish						
	Screed & Rodding Machine Operator						
	Troweling Machine Operator (all concrete surfaces)						
	Trowering machine operator (an concrete surfaces)					L&M	
A0404	Group IV, including:	44.43 8	.80 1	11.80	1 53	0.10	66.66

Acoustical or Imitation Acoustical Finish

Application of All Composition Mastic

Application of All Epoxy Material

Application of All Plastic Material

Finish Colored Concrete

Gunite Nozzleman

Hand Powered Grinder

Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement fund; LEG=legal fund; L&M=labor/management fund; PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=total hourly rate; VAC=vacation

Class Code	Classification of Laborers & Mechanics	BHR H&V	V PEN	TRN	Other Benefits	THR
<mark>Ceme</mark> i	nt Masons					
;	*See per diem note on last page					
					L&M	
A0404	Group IV, including:	44.43 8.80	11.80	1.53	0.10	66.66
	Preparing, scratching and browsing of all ceilings and walls, finished with terrazo or tile					
	Tunnel Worker					
A0405	Group V, including:	44.43 8.80	11.80	1.53	L&M 0.10	66.66
	Casting and finishing					
	EIFS Systems					
	Finishing of all interior and exterior plastering					
	Fireproofing (Pryocrete, Cafco, Albi-Clad, sprayed fiberglass)					
	Gypsum, Portland Cement					
	Kindred material and products					
	Operation and control of all types of plastering machines, including power tools and floats, used by the industry					
	Overcoating and maintenance of interior/exterior plaster surfaces					
	Plasterer					
	Veneer plastering process (Rapid Plaster, U.S.G. "Imperial Systems", and Pabcoat Systems")					
	Venetian plaster and color-integrated Italian/Middle-Eastern line plaster					
Culina	ary Workers					
					LEG	
A0501	Baker/Cook	29.95 7.53	8.68			46.16
					LEG	
A0503	General Helper	25.82 7.53	8.68			42.03
	Housekeeper					
	Janitor					
	Kitchen Helper					
	Titolion Tiespol				LEG	
A0504	Head Cook	29.95 7.53	8.68			46.16
					LEG	
A0505	Head Housekeeper	26.20 7.53	8.68			42.41
	Head Kitchen Help					
	•					
Dredg						
	*See per diem note on last page					

A0601 Assistant Engineer Craneman

Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement fund; LEG=legal fund; L&M=labor/management fund; PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=total hourly rate; VAC=vacation

74.21

0.05

L&M

0.10

46.91 11.40 14.75 1.00

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other l	Benefits	THR
<mark>Dredg</mark>						
*	See per diem note on last page					
<u>A0601</u>	Assistant Engineer	46.91 11.40 14.75	1.00	L&M 0.10	0.05	74.21
	Electrical Generator Operator (primary pump/power barge/dredge) Engineer Welder					
<u>A0602</u>	Assistant Mate (deckhand)	45.65 11.40 14.75	1.00	L&M 0.10	0.05	72.95
A0603	Fireman	46.13 11.40 14.75	1.00	L&M 0.10	0.05	73.43
A0605	Leverman Clamshell	49.64 11.40 14.75	1.00	L&M 0.10	0.05	76.94
A0606	Leverman Hydraulic	47.74 11.40 14.75	1.00	L&M 0.10	0.05	75.04
<u>A0607</u>	Mate & Boatman	46.91 11.40 14.75	1.00	L&M 0.10	0.05	74.21
<u>A0608</u>	Oiler (dredge)	46.13 11.40 14.75	1.00	L&M 0.10	0.05	73.43
Electri *	icians See per diem note on last page					
	Inside Cable Splicer	44.44 14.40 14.22	0.95	L&M 0.25	LEG 0.15	74.41
<u>A0702</u>	Inside Journeyman Wireman, including:	44.44 14.40 14.22	0.95	L&M 0.25	LEG 0.15	74.41
	Technicians (including use of drones in electrical construction)					
<u>A0703</u>	Power Cable Splicer	65.19 14.40 19.15	0.95	L&M 0.25	LEG 0.15	100.09
<u>A0704</u>	Tele Com Cable Splicer	52.53 14.40 17.98	0.95	L&M 0.25	LEG 0.15	86.26
A0705	Power Journeyman Lineman, including:	63.44 14.40 19.09	0.95	L&M 0.25	LEG 0.15	98.28
	Power Equipment Operator Technician (including use of drones in electrical construction)					
<u>A0706</u>	Tele Com Journeyman Lineman, including:	50.78 14.40 17.92	0.95	L&M 0.25	LEG 0.15	84.45

Technician (including use of drones in telecommunications construction)

Tele Com Equipment Operator

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other I	Benefits	THR
Electri	Scians See per diem note on last page					
A0707	Straight Line Installer - Repairman	50.78 14.40 17.92	2 0.95	L&M 0.25		84.45
<u>A0708</u>	Powderman	61.44 14.40 19.03	0.95	L&M 0.25		96.22
<u>A0710</u>	Material Handler	28.07 14.02 5.84	0.15	L&M 0.15	LEG 0.15	48.38
A0712	Tree Trimmer Groundman	31.78 14.40 14.30	0.15	L&M 0.15	LEG 0.15	60.93
A0713	Journeyman Tree Trimmer	40.71 14.40 14.57	0.15	L&M 0.15	LEG 0.15	70.13
A0714	Vegetation Control Sprayer	44.26 14.40 14.68	3 0.15	L&M 0.15	LEG 0.15	73.79
<u>A0715</u>	Inside Journeyman Communications CO/PBX	44.44 14.40 14.22	2 0.95	L&M 0.25	LEG 0.15	74.41
	or Workers See per diem note on last page					
	see per diem note on last page			L&M	VAC	
A0802	Elevator Constructor	46.08 16.07 20.56	0.70	1.00		89.52
A0803	Elevator Constructor Mechanic	65.83 16.07 20.56	6 0.70	L&M 1.00	VAC 7.30	111.46
	& Frost Insulators/Asbestos Workers					
-	See per diem note on last page			TAE	T 3.41	
A0902	Asbestos Abatement-Mechanical Systems	41.35 9.24 11.12	2 1.50	IAF 0.14	LML 0.05	63.40
A0903	Asbestos Abatement/General Demolition All Systems	41.35 9.24 11.12	2 1.50	IAF 0.14	LML 0.05	63.40
A0904	Insulator, Group II	41.35 9.24 11.12	2 1.50	IAF 0.14	LML 0.05	63.40
<u>A0905</u>	Fire Stop	41.35 9.24 11.12	2 1.50	IAF 0.14	LML 0.05	63.40
	orkers					
>	See per diem note on last page					
A1101	Ironworkers, including:	41.49 9.91 24.95	0.77	L&M 0.20	IAF 0.24	77.56

Class Code	Classification of Laborers & Mechanics	BHR H&W	PEN	TRN	Other I	Benefits	THR
<mark>IronW</mark>	orkers						
*	See per diem note on last page						
<u>A1101</u>	Ironworkers, including:	41.49 9.91	24.95	0.77	L&M 0.20	IAF 0.24	77.56
	Bender Operators						
	Bridge & Structural						
	Hangar Doors						
	Hollow Metal Doors						
	Industrial Doors						
	Machinery Mover						
	Ornamental						
	Reinforcing						
	Rigger						
	Sheeter						
	Signalman						
	Stage Rigger						
	Toxic Haz-Mat Work						
	Welder						
A1102	Helicopter	42.49 9.91	24 95	0.77	L&M 0.20	IAF 0.24	78.56
711102	•	12.19 9.91	2 1.75	0.77	0.20	0.21	70.50
	Helicopter (used for rigging and setting)						
	Tower (energy producing windmill type towers to include nacelle and blades)						
A1103	Fence/Barrier Installer	37.99 9.91	24.95	0.77	L&M 0.20	IAF 0.24	74.06
					T 0 3 4		
A 1104	Guard Rail Layout Man	38.73 9.91	24 95	0.77	L&M 0.20	IAF 0.24	74.80
AIIUT	Guard Rail Layout Mail	30.73 7.71	27.73	0.77	0.20	0.24	74.00
		•	• • • •		L&M		
A1105	Guard Rail Installer	38.99 9.91	24.95	0.77	0.20	0.24	75.06
Labor	ers (The Alaska areas north of N63 latitude and east of W138 lo	ngitude)					
	See per diem note on last page	g					
N1201	Cuova I in alvedia ac	26.00. 0.55	21 16	1 65	L&M	LEG	68.86
NIZUI	Group I, including:	36.00 9.55	21.10	1.03	0.30	0.20	00.00
	Asphalt Worker (shovelman, plant crew)						
	Brush Cutter						
	Camp Maintenance Laborer						
	Carpenter Tender or Helper						
	Choke Setter, Hook Tender, Rigger, Signalman						
	Concrete Labor (curb & gutter, chute handler, curing, grouting,						
	screeding)						
	Crusher Plant Laborer						
	Demolition Laborer						

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Laborers (The Alaska areas north of N63 latitude and east of W138 longitude)

*See per diem note on last page

L&M LEG

N1201 Group I, including:

36.00 9.55 21.16 1.65 0.30 0.20 68.86

Ditch Digger

Dumpman

Environmental Laborer (hazard/toxic waste, oil spill)

Fence Installer

Fire Watch Laborer

Flagman

Form Stripper

General Laborer

Guardrail Laborer, Bridge Rail Installer

Hydro Seeder Nozzleman

Laborer, Building

Landscaper or Planter

Laying of Mortarless Decorative Block (retaining walls, flowered

decorative block 4 feet or less - highway or landscape work)

Material Handler

Pneumatic or Power Tools

Portable or Chemical Toilet Serviceman

Pump Man or Mixer Man

Railroad Track Laborer

Sandblast, Pot Tender

Saw Tender

Slurry Work

Steam Cleaner Operator

Steam Point or Water Jet Operator

Storm Water Pollution Protection Plan Worker (SWPPP Worker -

erosion and sediment control Laborer)

Tank Cleaning

Utiliwalk & Utilidor Laborer

Burning & Cutting Torch

Watchman (construction projects)

Window Cleaner

L&M LEG

37.00 9.55 21.16 1.65 0.30 0.20 69.86

N1202 Group II, including:

Cement or Lime Dumper or Handler (sack or bulk)

Certified Erosion Sediment Control Lead (CESCL Laborer)

Choker Splicer

Chucktender (wagon, air-track & hydraulic drills)

Concrete Laborer (power buggy, concrete saws, pumpcrete nozzleman,

vibratorman)

Culvert Pipe Laborer

Cured Inplace Pipelayer

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Laborers (The Alaska areas north of N63 latitude and east of W138 longitude)

*See per diem note on last page

L&M LEG

N1202 Group II, including:

37.00 9.55 21.16 1.65 0.30 0.20 69.86

Environmental Laborer (asbestos, marine work)

Floor Preparation, Core Drilling

Foam Gun or Foam Machine Operator

Green Cutter (dam work)

Gunite Operator

Hod Carrier

Jackhammer/Chipping Gun or Pavement Breaker

Laser Instrument Operator

Laying of Mortarless Decorative Block (retaining walls, flowered

decorative block over 4 feet - highway or landscape work)

Mason Tender & Mud Mixer (sewer work)

Pilot Car

Pipelayer Helper

Plasterer, Bricklayer & Cement Finisher Tender

Powderman Helper

Power Saw Operator

Railroad Switch Layout Laborer

Sandblaster

Scaffold Building & Erecting

Sewer Caulker

Sewer Plant Maintenance Man

Thermal Plastic Applicator

Timber Faller, Chainsaw Operator, Filer

Timberman

L&M LEG

0.20

70.76

0.30

37.90 9.55 21.16 1.65

41.78 9.55 21.16 1.65 0.30

N1203 Group III, including: Bit Grinder

Camera/Tool/Video Operator

Guardrail Machine Operator

High Rigger & Tree Topper

High Scaler

Multiplate

N1204 Group IIIA

Plastic Welding

Slurry Seal Squeegee Man

Traffic Control Supervisor

Welding Certified (in connection with laborer's work)

L&M LEG

0.20

74.64

Asphalt Raker, Asphalt Belly Dump Lay Down Drill Doctor (in the field)

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Laborers (The Alaska areas north of N63 latitude and east of W138 longitude)

*See per diem note on last page

L&M LEG

N1204 Group IIIA 41.78 9.55 21.16 1.65 0.30 0.20 74.64

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)

Pioneer Drilling & Drilling Off Tugger (all type drills)

Pipelayers

Powderman (Employee Possessor)

Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)

Traffic Control Supervisor, DOT Qualified

L&M LEG

N1205 Group IV 25.57 9.55 21.16 1.65 0.30 0.20 58.43

Final Building Cleanup

Permanent Yard Worker

L&M LEG

N1206 Group IIIB 47.36 5.50 21.16 1.65 0.30 0.20 76.17

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)(over 5,000 hours)

Federal Powderman (Responsible Person in Charge)

Grade Checking (setting or transferring of grade marks, line and grade,

GPS, drones)

Pioneer Drilling & Drilling Off Tugger (all type drills)(over 5,000 hours)

Stake Hopper

Laborers (The area that is south of N63 latitude and west of W138 longitude)

*See per diem note on last page

L&M LEG

68.86

S1201 Group I, including: 36.00 9.55 21.16 1.65 0.30 0.20

Asphalt Worker (shovelman, plant crew)

Brush Cutter

Camp Maintenance Laborer

Carpenter Tender or Helper

Choke Setter, Hook Tender, Rigger, Signalman

Concrete Labor (curb & gutter, chute handler, curing, grouting,

screeding)

Crusher Plant Laborer

Demolition Laborer

Ditch Digger

Dumpman

Environmental Laborer (hazard/toxic waste, oil spill)

Fence Installer

Fire Watch Laborer

Flagman

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Laborers (The area that is south of N63 latitude and west of W138 longitude)

*See per diem note on last page

L&M LEG

S1201 Group I, including:

36.00 9.55 21.16 1.65 0.30 0.20 68.86

Form Stripper

General Laborer

Guardrail Laborer, Bridge Rail Installer

Hydro Seeder Nozzleman

Laborer, Building

Landscaper or Planter

Laying of Mortarless Decorative Block (retaining walls, flowered

decorative block 4 feet or less - highway or landscape work)

Material Handler

Pneumatic or Power Tools

Portable or Chemical Toilet Serviceman

Pump Man or Mixer Man

Railroad Track Laborer

Sandblast, Pot Tender

Saw Tender

Slurry Work

Steam Cleaner Operator

Steam Point or Water Jet Operator

Storm Water Pollution Protection Plan Worker (SWPPP Worker -

erosion and sediment control Laborer)

Tank Cleaning

Utiliwalk & Utilidor Laborer

Watchman (construction projects)

Window Cleaner

L&M LEG

69.86

S1202 Group II, including: 37.00 9.55 21.16 1.65 0.30 0.20

Burning & Cutting Torch

Cement or Lime Dumper or Handler (sack or bulk)

Certified Erosion Sediment Control Lead (CESCL Laborer)

Choker Splicer

Chucktender (wagon, air-track & hydraulic drills)

Concrete Laborer (power buggy, concrete saws, pumperete nozzleman,

vibratorman)

Culvert Pipe Laborer

Cured Inplace Pipelayer

Environmental Laborer (asbestos, marine work)

Floor Preparation, Core Drilling

Foam Gun or Foam Machine Operator

Green Cutter (dam work)

Gunite Operator

Hod Carrier

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Laborers (The area that is south of N63 latitude and west of W138 longitude)

*See per diem note on last page

L&M LEG

S1202 Group II, including:

37.00 9.55 21.16 1.65 0.30 0.20 69.86

Jackhammer/Chipping Gun or Pavement Breaker

Laser Instrument Operator

Laying of Mortarless Decorative Block (retaining walls, flowered

decorative block over 4 feet - highway or landscape work)

Mason Tender & Mud Mixer (sewer work)

Pilot Car

Pipelayer Helper

Plasterer, Bricklayer & Cement Finisher Tender

Powderman Helper

Power Saw Operator

Railroad Switch Layout Laborer

Sandblaster

Scaffold Building & Erecting

Sewer Caulker

Sewer Plant Maintenance Man

Thermal Plastic Applicator

Timber Faller, Chainsaw Operator, Filer

Timberman

L&M LEG

S1203 Group III, including:

37.90 9.55 21.16 1.65 0.30 0.20 70.76

Bit Grinder

Camera/Tool/Video Operator

Guardrail Machine Operator

High Rigger & Tree Topper

High Scaler

Multiplate

Plastic Welding

Slurry Seal Squeegee Man

Traffic Control Supervisor

Welding Certified (in connection with laborer's work)

L&M LEG

S1204 Group IIIA

41.78 9.55 21.16 1.65 0.30 0.20 74.64

Asphalt Raker, Asphalt Belly Dump Lay Down

Drill Doctor (in the field)

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)

Pioneer Drilling & Drilling Off Tugger (all type drills)

Pipelayers

Powderman (Employee Possessor)

Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other l	Benefits	THR
Labor	ers (The area that is south of N63 latitude and west of W138 long	gitude)				
,	*See per diem note on last page					
S1204	Group IIIA	41.78 9.55 21.16	1.65	L&M 0.30	LEG 0.20	74.64
	Traffic Control Supervisor, DOT Qualified			T 0 M	LEC	
S1205	Group IV	25.57 9.55 21.16	1.65	L&M 0.30	LEG 0.20	58.43
	Final Building Cleanup Permanent Yard Worker					
S1206	Group IIIB	47.36 5.50 21.16	1.65	L&M 0.30	LEG 0.20	76.17
	Driller (including, but not limited to wagon drills, air-track drills, hydraulic drills)(over 5,000 hours)					
	Federal Powderman (Responsible Person in Charge) Grade Checking (setting or transferring of grade marks, line and grade, GPS, drones)					
	Pioneer Drilling & Drilling Off Tugger (all type drills)(over 5,000 hours) Stake Hopper					
Millw	rights					
;	*See per diem note on last page					
A1251	Millwright (journeyman)	46.48 10.35 12.87	1.10	L&M 0.40	0.05	71.25
A1252	Millwright Welder	47.48 10.35 12.87	1.10	L&M 0.40	0.05	72.25
	ers, Region I (North of N63 latitude) *See per diem note on last page					
	see per diem note on last page					
N1301	Group I, including:	36.08 9.27 15.10	1.08	L&M 0.07		61.60
	Brush					
	General Painter Hand Taping					
	Hazardous Material Handler					
	Lead-Based Paint Abatement					
	Roll					
N1302	Group II, including:	36.60 9.27 15.10	1.08	L&M 0.07		62.12
	Bridge Painter					
	Epoxy Applicator					
	General Drywall Finisher					
	Hand/Spray Texturing Industrial Coatings Specialist					
	muusutat Coaungs specianst					

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benefits THR
Painte	ers, Region I (North of N63 latitude)	
;	*See per diem note on last page	
N1302	Group II, including:	L&M 36.60 9.27 15.10 1.08 0.07 62.12
	Machine/Automatic Taping	
	Pot Tender	
	Sandblasting	
	Specialty Painter	
	Spray	
	Structural Steel Painter	
	Wallpaper/Vinyl Hanger	
N1304	Group IV, including:	42.74 9.27 18.21 1.05 0.05 71.32
	Glazier	
	Storefront/Automatic Door Mechanic	
N1305	Group V, including:	39.86 9.27 5.00 1.10 0.10 55.33
	Carpet Installer	
	Floor Coverer	
	Heat Weld/Cove Base	
	Linoleum/Soft Tile Installer	
N1306	Group VI, including:	50.44 10.23 5.00 1.10 0.10 66.87
	Traffic Control Striper	
Painte	ers, Region II (South of N63 latitude)	
;	*See per diem note on last page	
		L&M
S1301	Group I, including:	33.22 9.27 15.95 1.08 0.07 59.59
	Brush	
	General Painter	
	Hand Taping	
	Hazardous Material Handler	
	Lead-Based Paint Abatement	
	Roll	
	Spray	
<u>S1302</u>	Group II, including:	L&M 34.47 9.27 15.95 1.08 0.07 60.84
	General Drywall Finisher	
	Hand/Spray Texturing	
	Machine/Automatic Taping	

Wallpaper/Vinyl Hanger

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benef	its THR
	ers, Region II (South of N63 latitude)		
	*See per diem note on last page		
<u>S1303</u>	Group III, including:	L&M 34.57 9.27 15.95 1.08 0.07	60.94
	Bridge Painter		
	Epoxy Applicator		
	Industrial Coatings Specialist		
	Pot Tender		
	Sandblasting		
	Specialty Painter		
	Structural Steel Painter		
		L&M	
<u>S1304</u>	Group IV, including:	42.95 9.27 17.25 1.08 0.07	70.62
	Glazier		
	Storefront/Automatic Door Mechanic		
		L&M	
S1305	Group V, including:	39.86 9.27 5.00 1.10 0.10	55.33
	Carpet Installer		
	Floor Coverer		
	Heat Weld/Cove Base		
	Linoleum/Soft Tile Installer		
<u>S1306</u>	Group VI, including:	50.44 10.23 5.00 1.10 0.10	66.87
	Traffic Control Striper		
<mark>Piledr</mark>	ivers		
:	*See per diem note on last page		
		L&M IAI	
A1401	Piledriver	43.34 10.35 15.82 1.75 0.20 0.20	
'	Assistant Dive Tender		
	Carpenter/Piledriver		
	Rigger		
	Sheet Stabber		
	Skiff Operator		
	Skiii Operator	L&M IAI	7
A1402	Piledriver-Welder/Toxic Worker	44.34 10.35 15.82 1.75 0.20 0.20	
<u> </u>	Remotely Operated Vehicle Pilot/Technician	L&M IAI 47.65 10.35 15.82 1.75 0.20 0.20	
111703	• •	17.03 10.33 13.02 1.73 0.20 0.21	0 10.71
	Single Atmosphere Suit, Bell or Submersible Pilot		
11101	D'- (- 1') **0	L&M IAI	
A1404	Diver (working) **See note on last page	87.45 10.35 15.82 1.75 0.20 0.20	0 115.77

Class						
Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other E	Benefits	THR
Piledri						
7	See per diem note on last page					
<u>A1405</u>	Diver (standby) **See note on last page	47.65 10.35 15.82	1.75	L&M 0.20	IAF 0.20	75.97
A1406	Dive Tender **See note on last page	46.65 10.35 15.82	1.75	L&M 0.20	IAF 0.20	74.97
A1407	Welder (American Welding Society, Certified Welding Inspector)	48.90 10.35 15.82	1.75	L&M 0.20	IAF 0.20	77.22
	ers, Region I (North of N63 latitude) See per diem note on last page					
	see per diem note on last page					
N1501	Journeyman Pipefitter	46.06 11.75 17.45	1.50	L&M 0.75	S&L	77.51
	Plumber Welder					
Plumb	ers, Region II (South of N63 latitude)					
k	See per diem note on last page					
S1501	Journeyman Pipefitter	41.00 11.88 15.27	1.55	L&M 0.20		69.90
	Plumber Welder					
Plumb	ers, Region IIA (1st Judicial District)					
	See per diem note on last page					
X1501	Journeyman Pipefitter	41.50 13.67 11.75	2.70	L&M 0.24		69.86
	Plumber					
	Welder					
	Equipment Operators See per diem note on last page					
A1601	Group I, including:	47.74 11.40 14.75	1.00	L&M 0.10	0.05	75.04
111001	Asphalt Roller: Breakdown, Intermediate, and Finish Back Filler	11.10	2.00	2.10	2.00	, 5.01

Barrier Machine (Zipper)

Beltcrete with Power Pack & similar conveyors

Bending Machine Boat Coxswain

Bulldozer

Cableways, Highlines & Cablecars

Power Equipment Operators

*See per diem note on last page

L&M

A1601 Group I, including:

47.74 11.40 14.75 1.00 0.10 0.05 75.04

Cleaning Machine

Coating Machine

Concrete Hydro Blaster

Cranes (45 tons & under or 150 feet of boom & under (including jib & attachments))

- (a) Hydralifts or Transporters, (all track or truck type)
- (b) Derricks
- (c) Overhead

Crushers

Deck Winches, Double Drum

Ditching or Trenching Machine (16 inch or over)

Drag Scraper, Yarder, and similar types

Drilling Machines, Core, Cable, Rotary and Exploration

Finishing Machine Operator, Concrete Paving, Laser Screed, Sidewalk,

Curb & Gutter Machine

Grade Checker and/or Line and Grade including Drone

Helicopters

Hover Craft, Flex Craft, Loadmaster, Air Cushion, All-Terrain Vehicle,

Rollagon, Bargecable, Nodwell, & Snow Cat

Hydro Ax, Feller Buncher & similar

Hydro Excavation (Vac-Truck and Similar)

Loaders (2 1/2 yards through 5 yards, including all attachments):

- (a) Forklifts (with telescopic boom & swing attachment)
- (b) Front End & Overhead, (2-1/2 yards through 5 yards)
- (c) Loaders, (with forks or pipe clamp)
- (d) Loaders, (elevating belt type, Euclid & similar types)

Material Transfer Vehicle (Elevating Grader, Pickup Machine, and similar types)

Mechanic, Welder, Bodyman, Electrical, Camp & Maintenance Engineer

Micro Tunneling Machine

Mixers: Mobile type with hoist combination

Motor Patrol Grader

Mucking Machine: Mole, Tunnel Drill, Horizontal/Directional Drill

Operator and/or Shield

Off-Road Hauler (including Articulating and Haul Trucks)

Operator on Dredges

Piledriver Engineer, L.B. Foster, Puller or similar paving breaker

Plant Operator (Asphalt & Concrete)

Power Plant, Turbine Operator 200 k.w & over (power plants or

combination of power units over 300 k.w.)

Remote Controlled Equipment

Scraper (through 40 yards)

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Power Equipment Operators

*See per diem note on last page

L&M

A1601 Group I, including:

47.74 11.40 14.75 1.00 0.10 0.05 75.04

Service Oiler/Service Engineer

Shot Blast Machine

Shovels, Backhoes, Excavators with all attachments, and Gradealls (3

yards & under)

Sideboom (under 45 tons)

Sub Grader (Gurries & similar types)

Tack Tractor

Truck Mounted Concrete Pump, Conveyor/Tele-belt, & Creter

Wate Kote Machine

L&M

A1602 Group IA, including:

49.64 11.40 14.75 1.00 0.10 0.05 76.94

Camera/Tool/Video Operator (Slipline)

Certified Welder, Electrical Mechanic, Camp Maintenance Engineer,

Mechanic (over 10,000 hours)

Cranes (over 45 tons or 150 feet including jib & attachments)

- (a) Clamshells & Draglines (over 3 yards)
- (b) Tower Cranes

Licensed Water/Waste Water Treatment Operator

Loaders (over 5 yards)

Motor Patrol Grader, Dozer, Grade Tractor (finish: when finishing to

final grade and/or to hubs, or for asphalt)

Power Plants (1000 k.w. & over)

Profiler, Reclaimer, and Roto-Mill

Quad

Scrapers (over 40 yards)

Screed

Shovels, Backhoes, Excavators with all attachments (over 3 yards)

Sidebooms (over 45 tons)

Slip Form Paver, C.M.I. & similar types

Topside (Asphalt Paver, Slurry machine, Spreaders, and similar types)

L&M

A1603 Group II, including:

46.91 11.40 14.75 1.00 0.10 0.05 74.21

Boiler - Fireman

Cement Hogs & Concrete Pump Operator

Conveyors (except those listed in Group I)

Hoists on Steel Erection, Towermobiles & Air Tuggers

Horizontal/Directional Drill Locator

Locomotives, Rod & Geared Engines

Mixers

Screening, Washing Plant

Class
Code

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Power Equipment Operators

*See per diem note on last page

L&M

A1603 Group II, including:

46.91 11.40 14.75 1.00 0.10 0.05 74.21

Sideboom (cradling rock drill, regardless of size)

Skidder

Trenching Machines (under 16 inches)

Water/Waste Water Treatment Operator

L&M

A1604 Group III, including:

46.13 11.40 14.75 1.00 0.10 0.05 73.43

"A" Frame Trucks, Deck Winches

Bombardier (tack or tow rig)

Boring Machine

Brooms, Power (sweeper, elevator, vacuum, or similar)

Bump Cutter

Compressor

Farm Tractor

Forklift, Industrial Type

Gin Truck or Winch Truck (with poles when used for hoisting)

Hoists, Air Tuggers, Elevators

Loaders:

- (a) Elevating-Athey, Barber Greene & similar types
- (b) Forklifts or Lumber Carrier (on construction job sites)
- (c) Forklifts, (with tower)
- (d) Overhead & Front End, (under 2-1/2 yards)

Locomotives: Dinkey (air, steam, gas & electric) Speeders

Mechanics, Light Duty

Oil. Blower Distribution

Posthole Digger, Mechanical

Pot Fireman (power agitated)

Power Plant, Turbine Operator, (under 200 k.w.)

Pumps, Water

Roller (other than Asphalt)

Saws, Concrete

Skid Hustler

Skid Steer (with all attachments)

Stake Hopper

Straightening Machine

Tow Tractor

L&M

A1605 Group IV, including:

39.42 11.40 14.75 1.00 0.10 0.05 66.72

Crane Assistant Engineer/Rig Oiler

Drill Helper

Parts & Equipment Coordinator

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other I	Benefits	THR
Power	Equipment Operators					
*	See per diem note on last page					
A 1605	Group IV, including:	39.42 11.40 14.75	1.00	L&M 0.10	0.05	66.72
A1003	Group IV, including.	35.42 11.40 14.73	1.00	0.10	0.03	00.72
	Spotter					
	Steam Cleaner					
	Swamper (on trenching machines or shovel type equipment)					
Roofer	·s					
*	See per diem note on last page					
				L&M		
A1701	Roofer & Waterproofer	47.62 13.75 3.91	0.81	0.10	0.06	66.25
				L&M		
A1702	Roofer Material Handler	34.23 13.75 3.91	0.81	0.10	0.06	52.86

N1801 Sheet Metal Journeyman 50.83 12.25 14.86 1.80 0.12 79.86

Air Balancing and duct cleaning of HVAC systems

Brazing, soldering or welding of metals

*See per diem note on last page

Demolition of sheet metal HVAC systems

Fabrication and installation of exterior wall sheathing, siding, metal roofing, flashing, decking and architectural sheet metal work

Fabrication and installation of heating, ventilation and air conditioning

ducts and equipment

Fabrication and installation of louvers and hoods

Fabrication and installation of sheet metal lagging

Fabrication and installation of stainless steel commercial or industrial

food service equipment

HVAC-R Service Mechanic, servicing and maintaining HVAC-R

Systems

Manufacture, fabrication assembly, installation and alteration of all

ferrous and nonferrous metal work

Metal lavatory partitions

Preparation of drawings taken from architectural and engineering plans

required for fabrication and erection of sheet metal work

Sheet Metal shelving

Sheet Metal venting, chimneys and breaching

Skylight installation

Sheet Metal Workers, Region II (South of N63 latitude)

*See per diem note on last page

Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement fund; LEG=legal fund; L&M=labor/management fund; PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=total hourly rate; VAC=vacation

L&M

Class	
Code	Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

C1 . 3.5 . 1	*** *	T . TT		03760	
Sheet Metal	Workers	Region II	South	of N63	latitudel
Sheet Mictai	VV OI IXCI 39	Tregion II	Douth	01 1 105	iatitude,

*See per diem note on last page

L&M 45.35 12.23 14.70 1.83 0.43

74.54

S1801 Sheet Metal Journeyman

Air Balancing and duct cleaning of HVAC systems

Brazing, soldering or welding of metals

Demolition of sheet metal HVAC systems

Fabrication and installation of exterior wall sheathing, siding, metal roofing, flashing, decking and architectural sheet metal work

Fabrication and installation of heating, ventilation and air conditioning ducts and equipment

Fabrication and installation of louvers and hoods

Fabrication and installation of sheet metal lagging

Fabrication and installation of stainless steel commercial or industrial food service equipment

HVAC-R Service Mechanic, servicing and maintaining HVAC-R Systems

Manufacture, fabrication assembly, installation and alteration of all

ferrous and nonferrous metal work

Metal lavatory partitions

Preparation of drawings taken from architectural and engineering plans

required for fabrication and erection of sheet metal work

Sheet Metal shelving

Sheet Metal venting, chimneys and breaching

Skylight installation

Sprinkler Fitters

*See per diem note on last page

A1901 Sprinkler Fitter	54.01 10.55 18.25 0.52	L&M 0.25	83.58
Surveyors			
*See per diem note on last page			
		L&M	
A2001 Chief of Parties	54.50 12.48 13.64 1.20	0.10	81.92
		L&M	
A2002 Party Chief	50.69 12.48 13.64 1.20	0.10	78.11
		L&M	
A2003 Line & Grade Technician/Office Technician/GPS, Drones	47.94 12.48 13.64 1.20	0.10	75.36
		L&M	
A2004 Associate Party Chief (including Instrument Person & Head Chain	45.69 12.48 13.64 1.20		73.11
Person)/Stake Hop/Grademan			

Class Code	Classification of Laborers & Mechanics	BHR H	I&W	PEN	TRN	Other Benefits	THR
<mark>Surve</mark> y	yors						
*	See per diem note on last page						
A2006	Chain Person (for crews with more than 2 people)	41.09 1	2.48	13.64	1.20	L&M 0.10	68.51
	Drivers See per diem note on last page						
A2101	Group I, including:	46.84 1	2.48	13.64	1.20	L&M 0.10	74.26
	Air/Sea Traffic Controllers Ambulance/Fire Truck Driver (EMT certified)						
	Boat Coxswain						
	Captains & Pilots (air & water)						
	Deltas, Commanders, Rollagons, & similar equipment (when pulling sleds, trailers or similar equipment)						
	Dump Trucks (including articulating end dumps, rockbuggy, side dump, belly dump, & trucks with pups) over 40 yards up to & including 60 yards	l					
	Fueler						
	Helicopter Transporter						
	Liquid Vac Truck/Super Vac Truck						
	Material Coordinator or Purchasing Agent						
	Oil Distributor Truck						
	Ready-mix (over 12 yards up to & including 15 yards) (over 15 yards to be negotiated)						
	Semi with Double Box Mixer						
	Tireman, Medium Duty (Truck Tires up to 1200-24")						
	Water Wagon (250 Bbls and above)						
A2102	Group 1A including:	48.19 1	2.48	13.64	1.20	L&M 0.10	75.61

Dump Trucks (including rockbuggy, side dump, belly dump & trucks with pups) over 60 yards up to & including 100 yards (over 100 yards to be negotiated)

Jeeps (driver under load)

Lowboys, including tractor attached trailers & jeeps, up to & including

12 axles (over 12 axles or 150 tons to be negotiated)

Tireman Heavy Duty (earthmover tires, i.e., loader, scraper, haul truck)

L&M A2103 Group II, including: 45.51 12.48 13.64 1.20 0.10 72.93

All Deltas, Commanders, Rollagons, & similar equipment

Batch Trucks (8 yards & up)

Batch Trucks (up to & including 7 yards)

Boom Truck/Knuckle Truck (over 5 tons)

Cacasco Truck/Heat Stress Truck

Construction and Material Safety Technician

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Truck Drivers

*See per diem note on last page

L&M

A2103 Group II, including:

45.51 12.48 13.64 1.20 0.10

72.93

Dump Trucks (including articulating end dump, rockbuggy, side dump,

belly dump, & trucks with pups) over 20 yards up to & including 40 yards

Gin Pole Truck, Winch Truck, Wrecker (truck mounted "A" frame

manufactured rating over 5 tons)

Mechanics

Partsman

Ready-mix (up to & including 12 yards)

Stringing Truck

Turn-O-Wagon or DW-10 (not self loading)

L&M

A2104 Group III, including:

44.64 12.48 13.64 1.20 0.10

72.06

Boom Truck/Knuckle Truck (up to & including 5 tons)

Dump Trucks (including articulating end dump, rockbuggy, side dump,

belly dump, & trucks with pups) over 10 yards up to & including 20 yards

Expeditor (electrical & pipefitting materials)

Gin Pole Truck, Winch Truck, Wrecker (truck mounted "A" frame

manufactured rating 5 tons & under)

Greaser - Shop

Semi or Truck & Trailer

Thermal Plastic Layout Technician

Traffic Control Technician

Trucks/Jeeps (push or pull)

L&M

A2105 Group IV, including:

44.02 12.48 13.64 1.20 0.10

71.44

Air Cushion or similar type vehicle

All Terrain Vehicle

Buggymobile

Bull Lift & Fork Lift, Fork Lift with Power Boom & Swing Attachment

(over 5 tons)

Bus Operator (over 30 passengers)

Cement Spreader, Dry

Combination Truck-Fuel & Grease

Compactor (when pulled by rubber tired equipment)

Dump Trucks (including rockbuggy, side dump, belly dump, & trucks

with pups) up to & including 10 yards

Dumpster

Expeditor (general)

Fire Truck/Ambulance Driver

Flat Beds, Dual Rear Axle

Foam Distributor Truck Dual Axle

Front End Loader with Fork

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Truck Drivers

*See per diem note on last page

L&M

A2105 Group IV, including: 44.02 12.48 13.64 1.20 0.10 71.44

Grease Truck

Hydro Seeder, Dual Axle

Hyster Operators (handling bulk aggregate)

Loadmaster (air & water operations)

Lumber Carrier

Ready-mix, (up to & including 7 yards)

Rigger (air/water/oilfield)

Tireman, Light Duty

Track Truck Equipment

Truck Vacuum Sweeper

Warehouseperson

Water Truck (Below 250 Bbls)

Water Truck (straight)

Water Wagon, Semi

L&M

A2106 Group V, including: 43.22 12.48 13.64 1.20 0.10 70.64

Buffer Truck

Bull Lifts & Fork Lifts, Fork Lifts with Power Boom & Swing

Attachments (up to & including 5 tons)

Bus Operator (up to 30 passengers)

Farm Type Rubber Tired Tractor (when material handling or pulling

wagons on a construction project)

Flat Beds, Single Rear Axle

Foam Distributor Truck Single Axle

Fuel Handler (station/bulk attendant)

Gear/Supply Truck

Gravel Spreader Box Operator on Truck

Hydro Seeder, Single Axle

Pickups (pilot cars & all light-duty vehicles)

Rigger

Swamper

Tack Truck (welders/gear)

Team Drivers (horses, mules, & similar equipment)

Tunnel Workers, Laborers (The Alaska areas north of N63 latitude and east of W138 longitude)

*See per diem note on last page

L&M LEG

N2201 Group I, including: 39.60 9.55 21.16 1.65 0.30 0.20 72.46

Brakeman

Mucker

Class	
Code	

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Tunnel Workers, Laborers (The Alaska areas north of N63 latitude and east of W138 longitude)

*See per diem note on last page

L&M LEG

N2201 Group I, including: 39.60 9.55 21.16 1.65 0.30 0.20 72.46

Nipper

Storm Water Pollution Protection Plan Worker (SWPPP Worker -

erosion and sediment control Laborer)

Topman & Bull Gang

Tunnel Track Laborer

L&M LEG

L&M

LEG

N2202 Group II, including: 40.70 9.55 21.16 1.65 0.30 0.20 73.56

Burning & Cutting Torch

Certified Erosion Sediment Control Lead (CESCL Laborer)

Concrete Laborer

Floor Preparation, Core Drilling

Jackhammer/Chipping Gun or Pavement Breaker

Laser Instrument Operator

Nozzlemen, Pumpcrete or Shotcrete

Pipelayer Helper

L&M LEG N2203 Group III, including: 41.69 9.55 21.16 1.65 0.30 0.20 74.55

Miner

Retimberman

L&M LEG N2204 Group IIIA, including: 45.96 9.55 21.16 1.65 0.30 0.20 78.82

Asphalt Raker, Asphalt Belly Dump Lay Down

Drill Doctor (in the field)

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)

Pioneer Drilling & Drilling Off Tugger (all type drills)

Pipelayer

Powderman (Employee Possessor)

Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)

Traffic Control Supervisor, DOT Qualified

N2206 Group IIIB, including: 52.10 5.50 21.16 1.65 0.30 0.20 80.91

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)(over 5,000 hours)

Federal Powderman (Responsible Person in Charge)

Grade Checking (setting or transferring of grade marks, line and grade,

GPS, drones)

Pioneer Drilling & Drilling Off Tugger (all type drills)(over 5,000 hours)

Stake Hopper

Class
Code

Classification of Laborers & Mechanics

BHR H&W PEN TRN Other Benefits THR

Tunnel Workers, Laborers (The area that is south of N63 latitude and west of W138 longitude)

*See per diem note on last page

L&M LEG

S2201 Group I, including: 39.60 9.55 21.16 1.65 0.30 0.20 72.46

Brakeman

Mucker

Nipper

Storm Water Pollution Protection Plan Worker (SWPPP Worker -

erosion and sediment control Laborer)

Topman & Bull Gang

Tunnel Track Laborer

L&M LEG

S2202 Group II, including: 40.70 9.55 21.16 1.65 0.30 0.20 73.56

Burning & Cutting Torch

Certified Erosion Sediment Control Lead (CESCL Laborer)

Concrete Laborer

Floor Preparation, Core Drilling

Jackhammer/Chipping Gun or Pavement Breaker

Laser Instrument Operator

Nozzlemen, Pumpcrete or Shotcrete

Pipelayer Helper

L&M LEG

LEG

LEG

L&M

L&M

S2203 Group III, including: 41.69 9.55 21.16 1.65 0.30 0.20 74.55

Miner

Retimberman

S2204 Group IIIA, including: 45.96 9.55 21.16 1.65 0.30 0.20 78.82

Asphalt Raker, Asphalt Belly Dump Lay Down

Drill Doctor (in the field)

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)

Pioneer Drilling & Drilling Off Tugger (all type drills)

Pipelayer

Powderman (Employee Possessor)

Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)

Traffic Control Supervisor, DOT Qualified

S2206 Group IIIB, including: 52.10 5.50 21.16 1.65 0.30 0.20 80.91

Driller (including, but not limited to wagon drills, air-track drills,

hydraulic drills)(over 5,000 hours)

Federal Powderman (Responsible Person in Charge)

Grade Checking (setting or transferring of grade marks, line and grade,

GPS, drones)

Pioneer Drilling & Drilling Off Tugger (all type drills)(over 5,000 hours)

L&M

0.10

0.05

78.04

50.74 11.40 14.75 1.00

Tunnel Workers, Laborers (The area that is south of N63 latitude and west of W138 longitude)

*See per diem note on last page

		L&M	LEG	
S2206 Group IIIB, including:	52.10 5.50 21.16 1.65	0.30	0.20	80.91

Stake Hopper

A2210 Group III

State Tropper		
Tunnel Workers, Power Equipment Operators		
*See per diem note on last page		
	L&M	
A2207 Group I	52.51 11.40 14.75 1.00 0.10 0.05 79	.81
	LOM	
	L&M	
A2208 Group IA	54.60 11.40 14.75 1.00 0.10 0.05 81	90
	L&M	
A2209 Group II	51.60 11.40 14.75 1.00 0.10 0.05 78	3.90

L&M A2211 Group IV 43.36 11.40 14.75 1.00 0.10 0.05 70.66

^{*} Per diem is an established practice for this classification. This means that per diem is an allowable alternative to board and lodging if all criteria are met. See 8 AAC 30.051-08 AAC 30.056, and the per diem information on page vii of this Pamphlet.

^{**} Work in combination of classifications: Employees working in any combination of classifications within the diving crew (working diver, standby diver, and tender) in a shift are paid in the classification with the highest rate for a minimum of 8 hours per shift.

Shipyard Rates Addendum

This Addendum was developed to address the specialized industry of shipbuilding/repair in Alaska, as it relates to public works. For the purposes of providing rates for shipyard work the Department is adopting Shipyard rates from the state of Washington (King County). These rates only apply to work done in shipbuilding/repair in Alaska, under a public contract. This addendum will be updated two times a year to coincide with the corresponding Issue of *Laborers and Mechanics MINIMUM RATES OF PAY*.

Class Code		BHR H&W PEN TRN Other Benefits THR
Shipyaro *Se	d Workers ee total hourly(THR) note below	
A2300	Ship Building/Repair Boilermaker	50.35
A2305	Ship Building/Repair Carpenter	50.95
A2310	Ship Building/Repair Crane Operator	45.06
A2315	Ship Building/Repair Electrician	50.42
A2320	Ship Building/Repair Heat & Frost Insulator	84.58
A2325	Ship Building/Repair Laborer	50.95
A2330	Ship Building/Repair Mechanist	50.95
A2335	Ship Building/Repair Operating Engineer	45.06
A2340	Ship Building/Repair Painter	50.95
A2345	Ship Building/Repair Pipefitter	50.95
A2350	Ship Building/Repair Rigger	50.35
A2355	Ship Building/Repair Sheet Metal	50.35
A2360	Ship Building/Repair Shipwright	50.95
A2365	Ship Building/Repair Warehouse	45.06

^{*}The THR includes the base hourly rate (BHR) and fringe benefits. Employers must pay a BHR and fringe benefit package that adds up to the THR. Fringe benefits included in the THR can be paid to employees in three ways; paid into a union trust fund, into an approved benefit plan, or paid directly on the paycheck as gross wages.

Appendix A

Project Plans and Specifications

Kenai Vintage Point Housing Boiler and Controls Replacement

Prepared for:



Prepared by:



670 W Fireweed Lane, Suite 200 Anchorage, AK 99503 907-276-0521

100% Construction Documents April 14, 2023

SPECIFICATIONS INDEX

DIVISION 0 - BIDDING REQUIREMENTS AND CONTRACT FORMS

NOT USED

DIVISION 1 - GENERAL REQUIREMENTS

NOT USED

DIVISION 2 - SITE WORK

NOT USED

DIVISION 3 - CONCRETE

NOT USED

DIVISION 4 - MASONRY

NOT USED

DIVISION 5 - METALS

NOT USED

DIVISION 6 - WOOD AND PLASTICS

NOT USED

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

NOT USED

DIVISION 8 – DOORS AND WINDOWS

NOT USED

DIVISION 9 - FINISHES

NOT USED

DIVISION 10 - SPECIALITIES

NOT USED

DIVISION 11 – EQUIPMENT

NOT USED

DIVISION 12 - FURNISHINGS

NOT USED

DIVISION 13 - SPECIAL CONSTRUCTION

NOT USED

DIVISION 22 - PLUMBING

NOT USED

SPECIFICATIONS INDEX

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SECTION 23 05 00	COMMON WORK RESULTS FOR HVAC
SECTION 23 05 05	SELECTIVE DEMOLITION FOR HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)
SECTION 23 05 19	METERS AND GAUGES FOR HVAC PIPING
SECTION 23 05 93	TESTING, ADJUSTING, AND BALANCING FOR HVAC
SECTION 23 07 00	HVAC INSULATION
SECTION 23 09 00	INSTRUMENTATION AND CONTROL FOR HVAC
SECTION 23 11 23	FACILITY NATURAL-GAS PIPING
SECTION 23 21 13	HYDRONIC PIPING
SECTION 23 21 16	HYDRONIC SPECIALTIES
SECTION 23 21 23	HYDRONIC PUMPS
SECTION 23 31 00	HVAC DUCTS AND CASINGS
SECTION 23 51 00	BREECHINGS, CHIMNEYS, AND STACKS
SECTION 23 52 16	CONDENSING BOILERS
DIVISION 26 - ELECTI	RICAL
SECTION 26 01 26	MAINTENANCE TESTING OF ELECTRICAL SYSTEMS
SECTION 26 05 00	COMMON WORK RESULTS FOR ELECTRICAL

SECTION	26 01 26	MAINTENANCE TESTING OF ELECTRICAL SYSTEMS
SECTION	26 05 00	COMMON WORK RESULTS FOR ELECTRICAL
SECTION	26 05 05	SELECTIVE DEMOLITION FOR ELECTRICAL
SECTION	26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
SECTION	26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION	26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION	26 05 33	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
SECTION	26 05 48	VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
SECTION	26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
SECTION	26 24 16	PANELBOARDS
SECTION	26 27 26	WIRING DEVICES
SECTION	26 29 13	ENCLOSURE CONTROLLERS
SECTION	26 36 23	AUTOMATIC TRANSFER SWITCHES

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General Requirements specifically applicable to Division 26.
- B. The electrical system equipment and installation shall comply with all provisions and requirements of this specification, as well as any and all applicable national, state and local codes and standards.

1.2 COORDINATION

- A. Coordinate the Work specified in this Division.
- B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of owner prior to proceeding.

1.3 REFERENCES

- A. ANSI/NFPA 70 National Electrical Code, latest adopted edition including all state and local amendments.
- B. NECA Standard of Installation.
- C. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. Electrical Reference Symbols: The Electrical "Legend" on drawings is standardized version for this project. All symbols shown may not be used on drawings. Use legend as reference for symbols used on plans.
- E. Electrical Drawings: Drawings are diagrammatic; complimentary to the Mechanical drawings; not intended to show all features of work. Install material not dimensioned on drawings in a manner to provide a symmetrical appearance. Do not scale drawings for exact equipment locations. Review Mechanical Drawings and adjust work to conform to conditions shown thereon. Field verification of dimensions, locations and levels is directed.

1.4 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 70.
- B. Conform to the latest adopted edition of the International Building Code and the International Fire Code including all state and local amendments thereto.
- C. Obtain electrical permits, plan review, and inspections from authority having jurisdiction.

1.5 SUBMITTALS

A. Submittal review is for general design and arrangement only and does not relieve the Contractor from any requirements of Contract Documents. Submittal not checked for quantity, dimension, fit or proper operation. Where deviations of substitute product or system performance have not

been specifically noted in the submittal by the Contractor, provisions of a complete and satisfactory working installation is the sole responsibility of the Contractor.

- B. The following is required for work provided under this division of the specification.
 - 1. Provide material and equipment submittals containing complete listings of material and equipment shown on Electrical Drawings and specified herein. Separate from work furnished under other divisions.
 - 2. Submittals shall be provided in PDF format with each section indexed in the PDF document. Submittals for Division 26 shall be complete and submitted at one time. Unless given prior approval, partial submittals will be returned unreviewed.
 - 3. Clearly identify all material and equipment by item, name or designation used on drawings and in specifications.
 - 4. Submit only pages which are pertinent; mark catalog sheets to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring diagrams and controls; component parts; finishes; dimensions; and required clearances.
 - 5. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.
 - 6. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
 - 7. Coordinate submittals with requirements of work and of Contract Documents.
 - 8. Certify in writing that the submitted shop drawings and product data are in compliance with requirements of Contract Documents. Notify Engineer in writing at time of submittal, of any deviations from requirements of Contract Documents.
 - 9. Do not fabricate products or begin work which requires submittals until return of submittal with Engineer acceptance.
 - 10. Equipment scheduled by manufacturer's name and catalog designations, manufacturer's published data and/or specification for that item, in effect on bid date, are considered part of this specification. Approval of other manufacturer's item proposed is contingent upon compliance therewith.

1.6 SUBSTITUTIONS

A. In accordance with the General Conditions and the General Requirements, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment.

1.7 PROJECT RECORD DRAWINGS

A. Maintain project record drawings.

- B. In addition to the other requirements, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all electrical work which will become permanently concealed. Show routing of work in permanently concealed blind spaces within the building. Show complete routing and sizing of any significant revisions to the systems shown.
- C. Record drawing field mark-ups shall be maintained on-site and shall be available for examination of the Owner's Representative at all times.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Provide operation and maintenance manuals for training of Owner's Representative in operation and maintenance of systems and related equipment. The following is required for work provided under this section of the specifications.
- B. Manuals shall be separate from work furnished under other divisions. Prepare a separate chapter for instruction of each class of equipment or system. Index and clearly identify each chapter and provide a table of contents.
- C. Provide one copy of all material for approval.
- D. The following is the suggested outline for operation and maintenance manuals and is presented to indicate the extent of items required in manuals.
 - 1. List chapters of information comprising the text. The following is a typical Table of Contents:
 - a. Electrical power distribution.
 - b. Automatic Transfer Switch
 - c. Standby generator.
 - d. Other chapters as necessary.
 - 2. Provide the following items in sequence for each chapter shown in Table of Contents:
 - a. Describe the procedures necessary for personnel to operate the system including start-up, operation, emergency operation and shutdown.
 - 1) Give complete instructions for energizing equipment and making initial settings and adjustments whenever applicable.
 - 2) Give step-by-step instructions for shutdown procedure if a particular sequence is required.
 - 3) Include test results of all tests required by this and other sections of the specifications.
 - b. Maintenance Instructions:
 - 1) Provide instructions and a schedule of preventive maintenance, in tabular form, for all routine cleaning and inspection with recommended lubricants if required for the following:
 - a) Automatic Transfer Switch

- b) Distribution equipment.
- c) Standby generator.
- 2) Provide instructions for minor repair or adjustments required for preventive maintenance routines, limited to repairs and adjustments which may be performed without special tools or test equipment and which requires no special training or skills.
- 3) Provide manufacturers' descriptive literature including approved shop drawings covering devices used in system, together with illustrations, exploded views, etc. Also include special devices provided by the Contractor.
- 4) Provide any information of a maintenance nature covering warranty items, etc., which have not been discussed elsewhere.
- 5) Include list of all equipment furnished for project, where purchased, technical representative if applicable and a local parts source with a tabulation of descriptive data of all electrical-electronic spare parts and all mechanical spare parts proposed for each type of equipment or system. Properly identify each part by part number and manufacturer.
- c. Inspection Certificate: Include copy of certificate of final inspection and acceptance from the Authority Having Jurisdiction.

1.9 DEMONSTRATION OF ELECTRICAL SYSTEMS

- A. During substantial completion inspection:
 - 1. Conduct operating test for approval.
 - 2. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents.
 - 3. Should any portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
 - 4. Have instruments available for measuring voltage and current values, and for demonstration of continuity, grounds, or open circuit conditions.
 - 5. Provide personnel to assist in taking measurements and making tests.

1.10 WARRANTY

- A. All materials, installation and workmanship for one (1) year from date of acceptance.
- B. Copies of manufacturer product warranties for all equipment shall be included in the operation and installation manuals.

1.11 INSTRUCTION OF OPERATING PERSONNEL

A. In accordance with the requirements of Division 01 and this section provide services of qualified representative of supplier of each item or system listed below to instruct designated personnel of Owner in operation and maintenance of item or system.

B. Make instruction when system is complete, of number of hours indicated, and performed at time mutually agreeable.

System or Equipment	Hours of Instruction
Back up power system	2
Modify/add other sections as necessary	4

- C. Certify that a Kenai based authorized service organization regularly carries complete stock of repair parts for listed equipment or systems, that organization is available and will furnish service within 48 hours after request. Include name, address and telephone number of service organization.
- D. Have approved operation and maintenance manuals and parts lists for all equipment on hand at time of instruction.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All Materials and Equipment shall be new.
- B. All Materials and Equipment shall be listed by Underwriter's Laboratories or equivalent third party listing agency for the use intended.
- C. Materials and Equipment shall be acceptable to the authority having jurisdiction as suitable for the use intended when installed per listing and labeling instructions.
- D. No materials or equipment containing asbestos in any form shall be used. Where materials or equipment provided by this Contractor are found to contain asbestos such items shall be removed and replaced with non-asbestos containing materials and equipment at no cost to the Owner.
- E. In describing the various items of equipment, in general, each item will be described singularly, even though there may be numerous similar items.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Install Work using procedures defined in NECA Standard of Installation and/or the manufacturer's installation instructions.

3.2 TESTS

- A. Perform tests in accordance with Section 26 01 26 Maintenance Testing of Electrical Systems.
- B. Notify the Owner's representative at least 72 hours prior to conducting any tests.
- C. Perform additional tests required under other sections of these specifications.
- D. Perform all tests in the presence of the Owner's representative.

3.3 PENETRATIONS OF FIRE BARRIERS

- A. All holes or voids created to extend electrical systems through fire rated floors, walls or ceiling shall be sealed with an asbestos-free intumescent fire stopping material capable of expanding 8 to 10 times when exposed to temperatures 250°F or higher.
- B. Materials shall be suitable for the fire stopping of penetrations made by steel, glass, plastic and shall be capable of maintaining an effective barrier against flame, smoke and gases in compliance with the requirements of ASTM E814 and UL 1479.
- C. The rating of the fire stops shall be the same as the time-rated floor, wall or ceiling assembly.
- D. Install fire stopping materials in accordance with the manufacturer's instructions.
- E. Unless protected from possible loading or traffic, install fire stopping materials in floors having void openings of four (4) inches or more to support the same floor load requirements as the surrounding floor.

END OF SECTION

SECTION 26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical Demolition.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on a non-destructive walkthrough and existing record documents. Report discrepancies to Owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work this Division.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Where abandoned conduit is installed below existing slab not scheduled for demolition, remove the conductors, cut conduit flush with floor, and patch surface.
- F. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Repair adjacent construction and finishes damaged during demolition and extension work. T-bar ceiling tiles damaged under normal construction conditions or having voids where junction boxes were removed shall be replaced by the Contractor.
- I. Maintain access to existing electrical installations which remain active.
- J. Extend existing installations using materials and methods as specified.
- K. Where materials or equipment are to be turned over to Owner or reused and installed by the Contractor, it shall be the Contractor's responsibility to maintain condition of materials and equipment equal to the existing condition of the equipment before the work began. Repair or replace damaged materials or equipment at no additional cost to the Owner.

3.4 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, reuse circuits available for reuse.
- B. Tag unused circuits as spare.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new updated directories where more than three circuits have been modified or rewired.

3.5 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions.

3.6 INSTALLATION

A. Install relocated materials and equipment.

3.7 DISPOSAL

A. Dispose of all hazardous waste in accordance with all local, State and Federal requirements.

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Building Wire.
- B. Cable.
- C. Wiring Connections and Terminations.

1.2 RELATED SECTIONS

- A. Section 26 01 26 Maintenance Testing of Electrical Systems.
- B. Section 26 05 53 Identification for Electrical Systems.

1.3 REFERENCES

- A. ANSI/NEMA WC 70-2021 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
- B. NETA ATS Acceptance testing specifications for Electrical Power Distribution and Systems.
- C. NFPA 262 Standard Method of test for flame travel and smoke of wires and cables for use in air-handling spaces.
- D. UL 83 Thermoplastic Insulated Wire and Cable.
- E. UL 1063 Standard for Machine and Tool Wire and Cable.
- F. UL 1424 Standard for Cables for Power-Limited Fire Alarm.
- G. UL 1479 Standard for Fire Tests of Through Wall Penetration Fire Stops.
- H. UL 1569 Standard for Metal Clad Cable.
- I. UL 1581 Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.4 SUBMITTALS

A. Submittals are not requested for this section.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Thermoplastic-insulated Building Wire: NEMA WC 70.
- B. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation, THW, THHN/THWN or XHHW-2 as indicated.

- C. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THHN/THWN or XHHW-2. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid or stranded conductor.
- D. Branch Circuit Wire Color Code:
 - 1. Color code wires by line or phase as follows:
 - a. Black, red, blue and white for 120/208V systems.
 - 2. For conductors 6 AWG and smaller, insulation shall be colored. For conductors 4 AWG and larger, identify with colored phase tape at all terminals, splices, and boxes.
 - 3. Grounding conductors 6 AWG and smaller shall have green colored insulation. For 4 AWG and larger, use green tape at both ends and at all other visible points in between, including pull and junction boxes.
- E. Control Circuits: Copper, stranded conductor 600 volt insulation, THHN/THNN or XHHW-2.

2.2 METAL CLAD CABLE

- A. UL 83, 1063, 1479, 1569, and 1581 listed, meets Federal Specification A-A-59544 (formerly J-C-30B). UL rated for installation in cable trays and environmental air handling spaces. Fire wall rated for 1, 2, and 3-hour through penetrations.
- B. Type MC Cable, Size 12 Through 10 AWG: Solid copper conductor, 600 volt thermoplastic insulation, rated 90° C dry, 75° wet, insulated green grounding conductor, and galvanized steel or aluminum armor over mylar.
- C. Type MC Cable, Size 8 Through 1 AWG: Stranded copper conductor, 600 volt thermoplastic insulation, rated 90° C dry, 75° wet, insulated green grounding conductor, and galvanized steel or aluminum armor over mylar.
- D. All metal clad cable shall be provided with color-coded insulation on all ungrounded conductors in accordance with NEC 210.5(C) and Part 3 of this section.

2.3 REMOTE CONTROL AND SIGNAL CABLE

- A. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 90° C, individual conductors twisted together, shielded, and covered with an overall PVC jacket; UL listed.
- B. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 90° C, individual conductors twisted together, shielded or unshielded (as required), and covered with a PVC jacket; UL listed.

2.4 WIRING CONNECTIONS AND TERMINATIONS

- A. For conductors 8 AWG and smaller:
 - 1. Dry interior areas: Spring wire connectors, pre-insulated "twist-on" rated 105 degrees C per UL 468C. Where stranded conductors are terminated on screw type terminals, install crimp insulated fork or ring terminals. Thomas & Betts Sta-Kon or equal.

- 2. Motor connections: Spring wire connectors, pre-insulated "twist-on" rated 105 degrees C per UL 468C. Provide a minimum of 8 wraps of Scotch 33+ electrical tape around conductors and connector to eliminate connector back off.
- 3. Wet or exterior: Spring wire connectors, pre-insulated "twist-on", resin filled rated for direct burial per UL 486D.

B. For conductors 6 AWG and larger:

- 1. Bus lugs and bolted connections: 600 V, 90 degrees C., two hole long barrel irreversible compression copper tin plated. Thomas & Betts or approved equal.
- 2. Motor connection: 600 V, 90 degrees C., copper tin plated compression motor pigtail connector, quick connect/disconnect, slip on insulator. Thomas & Betts or approved equal.
- 3. Two way connector for splices or taps: 600 V, 90 degrees C., compression long barrel, copper tin plated. Thomas & Betts or approved equal. Insulate with Scotch 23 rubber insulating base covering and Scotch 33+ outer wrap.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 18 AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.
- C. Splice only in junction or outlet boxes.
- D. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- E. Wiring in lighting fixture channels shall be rated for 90° C minimum.
- F. Do not share neutral conductors. Provide a dedicated neutral conductor for each branch circuit that requires a neutral.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Verify that raceway is complete and properly supported prior to pulling conductors. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Do not install XHHW-2 conductors when ambient temperatures are below 23F and THHN/THWN conductors when ambient temperatures are below 32F.
- D. Conductors shall be carefully inspected for insulation defects and protected from damage as they are installed in the raceway. Where the insulation is defective or damaged, the cable section shall be repaired or replaced at the discretion of the Owner and at no additional cost to the Owner.
- E. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

- F. Route conductors from each system in independent raceway system and not intermix in the same raceway, enclosure, junction box, wireway, or gutter as another system unless otherwise shown on the plans.
- G. No more than six current carrying conductors shall be installed in any homerun unless otherwise indicated on the drawings or without prior approval from the Engineer.
- H. Completely and thoroughly swab raceway system before installing conductors.
- I. When two or more neutrals are installed in one conduit, identify each with the proper circuit number in accordance with Section 26 05 53.

3.3 CABLE INSTALLATION

- A. Provide protection for exposed cables where subject to damage.
- B. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or cable ties to support cables from structure. Do not support cables from ceiling suspension system. Include bridle rings or drive rings.
- C. Use suitable cable fittings and connectors.

3.4 WIRING CONNECTIONS AND TERMINATIONS

- A. Stranded wire shall not be wrapped around screw terminals.
- B. Splice only in accessible junction boxes.
- C. Thoroughly clean wires before installing lugs and connectors.
- D. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- E. Terminate spare conductors with twist on connectors or heat shrink insulation to proper voltage rating.
- F. Control systems wiring in conjunction with mechanical, electrical or miscellaneous equipment to be identified in accordance with wiring diagrams furnished with equipment.
- G. Do not exceed manufacturer's recommended pull tensions.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions Section 26 01 26.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque conductor connections and terminations to manufacturer's recommended values.

3.6 WIRE AND CABLE INSTALLATION SCHEDULE

- A. All Locations: Building wire and/or remote control and signal cable in raceways
- B. At the Contractor's option, Metal Clad cable may be used for branch circuit wiring in dry locations other than homeruns. Homeruns shall be building wire in raceway.

Section 26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Power System Grounding.
- B. Electrical Equipment and Raceway Grounding and Bonding.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 01 26 Maintenance Testing of Electrical Systems.
- C. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.

1.3 REFERENCE STANDARDS

- A. ASTM B 3 Standard Specification for Soft or Annealed Copper Wire.
- B. IEEE Std 142 Recommended Practice for Grounding of Industrial and Commercial Power System.
- C. UL 467 Standard for Grounding and Bonding Equipment.

1.4 SYSTEM DESCRIPTION

A. Provide a complete grounding system for services and equipment as required by State and Local Codes, NEC, applicable portions of other NFPA codes, and as indicated herein.

1.5 SUBMITTALS

A. None required for this section

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Bonding Conductors: Solid bare copper wire for sizes No. 8 AWG and smaller diameter. Stranded bare copper wire for sizes No. 6 AWG and larger diameter. Conductors may be insulated conductors if used provide green insulation.
- B. Grounding Conductors: Copper conductor bare or green insulated.
- C. Mechanical Grounding and Bonding Connectors: Non-reversible crimp type lugs only. Use factory made compression lug for all terminations.
- D. In external locations, clamping shall be used only where a disconnect type of connection is required. Connection device may utilize threaded fasteners and shall be constructed such that

Section 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

positive contact pressure shall be maintained at all times. Machine bolts with lock washers shall be used.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide a separate, insulated equipment-grounding conductor in all feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing. Multiple conductors on single lug not permitted. Each grounding conductor shall terminate on its own terminal lug.
- B. Bond together exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, and receptacle ground connectors.
- C. Grounding conductors for branch circuits shall be sized in accordance with NEC, except minimum size grounding conductor shall be No. 12 AWG.
- D. Grounding conductor is in addition to neutral conductor and in no case shall neutral conductor serve as grounding means.

3.2 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Continuity Test: Continuity test shall be performed on all power receptacles to ensure that the ground terminals are properly grounded to the facility ground system.

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section included hangers and supports for Power Systems.
- B. Conduit Supports.
- C. Formed Steel Channel.
- D. Spring Steel Clips.
- E. Sleeves.
- F. Mechanical Sleeve Seals.
- G. Equipment Bases and Supports.

1.2 RELATED SECTIONS

A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.3 REFERENCES

A. International Building Code (IBC), Chapter 16 – Structural Design.

1.4 SUBMITTALS

A. Product Data: Submit product data for specialty supports.

1.5 COORDINATION

A. Coordinate size, shape and location of concrete pads with equipment provided.

1.6 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.
- B. Perform Work in accordance with State of Alaska Standard Specifications.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. Minerallac Fastening Systems.

- 3. O-Z Gedney Co.
- 4. Substitutions: per Division 01
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps general purpose: One-hole malleable iron for surface mounted conduits.
- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. self-locking.

2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
 - 1. B-Line Systems.
 - 2. Allied Tube & Conduit Corp.
 - 3. Unistrut Corp.
 - 4. Substitutions: per Division 01.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of existing conditions before starting work.

3.2 PREPARATION

- A. Obtain permission from Owner's Representative before using powder-actuated anchors.
- B. Obtain permission from Owner's Representative before drilling or cutting structural members.

3.3 INSTALLATION - GENERAL

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using, expansion anchors, , beam clamps, or spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry partitions and walls; expansion anchors in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- C. Do not support raceways, low voltage pathways, cables or boxes from ceiling suspension wires or suspended ceiling systems. Provide support from building structure independently to allow ceiling removal and replacement without removal of electrical system. If dedicated support wires are used, wires and wire clips must be painted or color-coded.

- D. Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or ceiling suspension system.
- E. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- F. In wet locations install free-standing electrical equipment on concrete pads. Pad top shall be a minimum of 3 ½" above the surrounding grade and shall be reinforced in accordance with Division 3 of these specifications.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- H. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- I. Securely fasten fixtures and equipment to building structure in accordance with manufacturer's recommendations and to provide necessary earthquake anchorage.
- J. Provide wall attached fixtures and equipment weighing less than 50 pounds with backing plates of at least 1/8" x 10" sheet steel or 2" x 10" fire retardant treated wood securely built into the structural walls. Submit attachment details of heavier equipment for approval.
- K. Earthquake Anchorages:
 - 1. Equipment weighing more than 50 pounds shall be adequately anchored to the building structure to resist lateral earthquake forces.
 - 2. Total lateral (earthquake) forces shall be 1.5 times the equipment weight acting laterally in any direction through the equipment center of gravity. Provide adequate backing at structural attachment points to accept the forces involved.
- L. Attach the supporting cables for all pendant fixtures to both the building structure and to the ceiling grid which they pass through.

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Metal Conduit.
- B. Flexible Metal Conduit.
- C. Liquidtight Metal Conduit.
- D. Electrical Metallic Tubing.
- E. Auxiliary Gutter.
- F. Fittings and Conduit Bodies.
- G. Wall and Ceiling Outlet Boxes.
- H. Pull and Junction Boxes.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- D. Section 26 05 29 Hangers and Supports for Electrical Systems.
- E. Section 26 05 53 Identification for Electrical Systems.
- F. Section 26 27 26 Wiring Devices.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI C80.1 Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated.
 - 3. ANSI C80.5 Rigid Aluminum Conduit.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 123 Specification for Zinc Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.
- C. National Electrical Manufacturers Association (NEMA):

- NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- 2. NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- 3. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. Underwriters Laboratory (UL):
 - 1. UL 6 Rigid Steel Conduit, Zinc Coated.
 - 2. UL6A Rigid Aluminum Conduit.
 - 3. UL 514B Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. National Fire Protection Association (NFPA):
 - NFPA 70 National Electrical Code.
- F. International Building Code (IBC):
 - 1. IBC chapters 16 and 17 seismic requirements.

1.4 RACEWAY AND BOX INSTALLATION SCHEDULE

- A. Underground more than 5 feet from foundation wall:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
 - a. Provide detectable warning tape over all underground raceways per section 26 05 53.
 - b. Provide 3-inch minimum spacing between raceways.
 - c. Provide 3/4 inch minus material 6 inches above and below conduit. Backfill remaining trench free of debris or rocks greater than 1 inch in diameter.
 - 2. Boxes and Enclosures: Provide concrete type 1A handhole.
- B. Under or in concrete slab, or underground within 5 feet of foundation wall:
 - Raceway: Provide rigid steel conduit or intermediate metal conduit. All conduit in contact
 with concrete or block shall be rigid steel conduit half lapped wrapped with pipe wrap or be
 plastic-coated conduit. Provide transition to rigid steel conduit 12 inches prior to exit
 penetration through foundations, concrete walls, or block walls. Provide transition to rigid
 steel conduit elbow and riser for penetration through slab. Arrange raceway so the curved
 portion of bend is not visible above finished slab.
 - 2. Boxes and Enclosures: Provide concrete tight cast and sheet metal steel metal boxes.
- C. In or through CMU walls:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may penetrate through CMU walls where the EMT is installed in a sleeve and does not come in

direct contact with the CMU. All conduit in contact with concrete or block shall be rigid steel conduit half lapped wrapped with pipe wrap or be plastic-coated conduit.

- 2. Boxes and Enclosures: Provide concrete tight cast and sheet metal steel metal boxes.
- D. Outdoor Above Grade, Damp or Wet Interior Locations:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
 - 2. Boxes and Enclosures: Provide weatherproof malleable iron for branch circuit junction and outlet boxes. Provide weatherproof NEMA 3R sheet metal enclosures for safety and disconnect switches and NEMA 4 sheet metal enclosures with gaskets for motor controllers and control panels.
 - 3. Fittings: Provide galvanized malleable iron with gaskets. Provide Myers threaded hubs for all conduit entries into top and side of sheet metal enclosures.

E. Concealed Dry Locations:

- 1. Raceway: Provide rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
- 2. Boxes and Enclosures: Provide sheet-metal boxes.
- 3. Fittings: Provide galvanized malleable iron and steel.

F. Exposed Dry Locations:

- 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. EMT conduit may be used where exposed conduit is allowed where it is not subject to physical damage or where installed on the ceiling or a minimum of ten feet above the floor.
- 2. Boxes and Enclosures: Provide sheet-metal boxes with raised steel covers.
- 3. Fittings: Provide galvanized malleable iron and steel.
- 4. Surface Raceway and Boxes. Where specifically noted on the Drawings, provide surface raceway and boxes.
- G. Branch Circuits 60 Amperes or Larger and Feeders:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit.
 - 2. Boxes and Enclosures: Provide sheet-metal boxes.
 - 3. Fittings: Provide galvanized malleable iron and steel.
- H. Equipment Connections: Provide short extensions (three feet maximum) of flexible metal conduit for connections to light fixtures, motors, transformers, vibrating equipment or equipment that requires removal for maintenance or replacement. Use Liquidtight flexible conduit and fittings for motors and equipment in damp or wet locations or subject to spilling of liquids as at pumps, kitchen equipment, in mechanical rooms, boiler rooms, pump rooms, etc.

1.5 DESIGN REQUIREMENTS

A. Raceway Minimum Size:

- 1. Below Grade: Provide 1 inch minimum, unless otherwise noted.
- 2. Above Grade or Slab on Grade: Provide 1/2 inch minimum, unless otherwise noted. Raceway may be reduced to ½ inch for final connection of raceway up to 6 feet for connection to fixture or device where maximum conduit entry size is ½ inch.
- 3. Line Voltage Circuits: Raceway is sized on the drawings for copper conductors with 600-Volt type XHHW insulation, unless otherwise noted. Where a raceway size is not shown on the drawings, it shall be calculated to not exceed the percentage fill specified in the NEC Table 1, Chapter 9 using the conduit dimensions of the NEC Table 4, Chapter 9 and conductor properties of the NEC Table 5, Chapter 9.
- B. Box Minimum Size: Provide all boxes sized and configured per NEC Article 370 and as specified in this section.
- C. Seismic Support: Provide support in accordance with section 26 05 29 Hangers and Supports for Electrical Systems and 26 05 48 Vibration and Seismic Support for Electrical Systems.

1.6 SUBMITTALS

A. Product Data: Submit data for products to be provided.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 - PRODUCTS

2.1 RIGID METAL CONDUIT (RMC)

- A. Rigid Steel Conduit: ANSI C80.1, UL 6.
- B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; Galvanized malleable iron with threaded hubs for all conduit entries. Provide threaded connections and couplings only. Set Screw and running thread fittings are not permitted.
- C. Provide insulated throat bushings at all conduit terminations.

2.2 INTERMEDIATE METAL CONDUIT (IMC)

- A. Product Description: ANSI C80.6, UL 1242; Galvanized Steel Conduit.
- B. Fittings and Conduit Bodies: NEMA FB 1, UL 514B; use fittings and conduit bodies specified above for rigid steel conduit.
- C. Provide insulated throat bushings at all conduit terminations.

2.3 FLEXIBLE METAL CONDUIT (FMC)

 Product Description: UL 1, FS WW-C-566; galvanized or zinc-coated flexible steel, full or reduced-wall thickness. B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron with insulated throat bushings. Die cast zinc or threaded inside throat fittings are not acceptable.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Product Description: UL 360, flexible metal conduit with interlocked steel construction and PVC jacket.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; liquid tight steel or malleable iron with insulated throat bushings. Die cast fittings are not acceptable.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Product Description: ANSI C80.3, UL 797; galvanized steel tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron, compression [or set screw] type with insulated throat bushings. Zinc die cast, set screw, or indentor fittings are not acceptable.
- C. Maximum size shall be 2". Provide factory elbows on sizes 1-½" and larger.

2.6 HIGH DENSITY POLYETHYLENE CONDUIT (HDPE)

A. Not approved for use on this project.

2.7 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, UL514A galvanized steel, with plaster ring where applicable.
 - 1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.
- B. Cast Boxes: NEMA FB 1, Type FD, galvanized malleable iron. Furnish gasketed cover by box manufacturer. Furnish threaded hubs. "Bell" boxes are not acceptable.
- C. Wall Plates: As specified in Section 26 27 26.

2.8 PULL AND JUNCTION BOXES

- A. Sheet Metal Pull and Junction Boxes: ANSI/NEMA OS 1, UL514A galvanized steel.
 - 1. Minimum Size: 4 inches square or octagonal, 1-1/2 inches deep, unless otherwise noted.
- B. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250, Type 4; flat-flanged, surface mounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron or copper-free cast aluminum.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.
- C. Cast Metal Boxes for Underground Installations: NEMA 250, Type 4; flat-flanged, flush-mounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron or copper-free cast aluminum.

- 2. Cover: Furnish with outside flange, neoprene gasket, and recessed stainless steel cover and screws.
- D. Fiberglass Concrete composite Type 1A Handholes: Die-molded glass-fiber concrete composite hand holes with pre-cut 6 x 6 inch cable entrance at center bottom of each side:
 - 1. Cover: Glass-fiber concrete composite, weatherproof cover with non-skid finish.
 - 2. Cover Legend: "ELECTRIC".

2.9 BUSHINGS

- A. Non-grounding: Threaded impact resistant plastic.
- B. Grounding: Insulated galvanized malleable iron/steel with hardened screw bond to raceway and conductor lug.

2.10 LOCKNUTS

A. Threaded Electro Zinc Plated Steel designed to cut through protective coatings for ground continuity.

2.11 WIREWAY

- A. Product Description: General purpose type wireway. Size per NEC minimum fill capacity required.
- B. Knockouts: Field-installed, no factory knockouts acceptable.
- C. Cover: Screw cover.
- D. Fittings and Accessories: Include factory couplings, offsets, elbows, adapters and support straps required for a complete system. Provide internal ground bonding jumper bonded to each section.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- B. Provide seismic support and fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- C. Identify raceway and boxes with origin and destination in accordance with Section 26 05 53.
- D. Unless otherwise noted, do not inter-mix conductors from separate panelboards or any other system in the same raceway system or junction boxes.

3.2 INSTALLATION - GENERAL RACEWAY

- A. Install raceway for all systems, unless otherwise noted.
- B. Install an equipment grounding conductor inside of all raceways containing line voltage conductors.

- C. Provide raceways concealed in construction unless specifically noted otherwise, or where installed at surface cabinets, motor and equipment connections and in Mechanical and Electrical Equipment rooms. Do not route conduits on roofs, outside of exterior walls, or along the surface of interior finished walls unless specifically noted on the plans.
- D. Raceway routing and boxes are shown in approximate locations unless dimensioned. Where raceway routing is not denoted, field-coordinate to provide complete wiring system.
- E. Do not route raceways on floor. Arrange raceway and boxes to maintain a minimum of 6 feet 6 inches of headroom and present a neat appearance. Install raceways level and square to a tolerance of 1/8" per 10 feet. Route exposed raceways and raceways above accessible ceilings parallel and perpendicular to walls, ceiling, and adjacent piping.
- F. Maintain minimum 6-inch clearance between raceway and mechanical and piping and ductwork. Maintain 12-inch clearance between raceway and heat sources such as flues, steam pipes, heating pipes, heating appliances, and other surfaces with temperatures exceeding 104 degrees F
- G. Where raceway penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating, seal opening around conduit with UL listed firestop sealant or intumescent firestop, preserving the fire time rating of the construction.
- H. Raceways and boxes penetrating vapor barriers or penetrating areas from cold to warm shall be taped and sealed with a non-hardening duct sealing compound to prevent the accumulation of moisture, and shall include a vapor barrier on the outside.
- I. Arrange raceway supports to prevent misalignment during wiring installation. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- J. Do not attach raceway to ceiling support wires or other piping systems and do not fasten raceway with wire or perforated pipe straps. Remove all wire used for temporary raceway support during construction, before conductors are pulled. Raceway shall be installed to permit ready removal of equipment, piping, ductwork, or ceiling tiles.
- K. Group raceway in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps, as specified in Section 26 05 29. Provide space on each rack for 25 percent additional raceway.
- L. Cut conduit square; de-burr cut ends. Bring conduit to the shoulder of fittings and couplings and fasten securely. Where locknuts are used, install with one inside box and one outside with dished part against box.
- M. Use threaded raintight conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations. Sealing locknuts are not acceptable.
- N. Install no more than the equivalent of three 90-degree bends between boxes.
- O. Install conduit bodies to make sharp changes in direction, such as around beams. "Goosenecks" in conduits are not acceptable.
- P. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.

- Q. Provide protective plastic bushings or insulated throat bushings at each raceway termination not installed to an enclosure. Bushings shall be threaded to the raceway end or connector.
- R. Avoid moisture traps; install junction box with drain fitting at low points in raceway system.
- S. Install fittings and flexible metal conduit to accommodate 3-axis movements where raceway crosses seismic joints.
- T. Install fittings designed and listed to accommodate expansion and contraction where raceway crosses control and expansion joints.
- U. Stub a minimum of 2 inches above floor all raceways terminated beneath free standing service equipment, pad mounted equipment, etc.
- V. Use cable sealing fittings forming a watertight non-slip connection to pass cords and cables into conduit. Size cable sealing fitting for the conductor outside diameter. Use Appleton CG series or equal cable sealing fittings.
- W. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
- X. Provide nylon "jet-line" or approved equal pull string in empty raceway, except sleeves and nipples.
- Y. Paint all exposed conduit to match surface to which it is attached or crosses. Clean greasy or dirty conduit prior to painting in accordance with paint manufacturer's instructions. Where raceway penetrates non-rated ceilings, floors or walls, provide patching, paint and trim to retain architectural aesthetics similar to surroundings.
- Z. Coat non-ferrous conduit threads prior to joining with conductive metallic grease antioxidant.

3.3 INSTALLATION – GENERAL BOXES

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance. All electrical box locations shown on Drawings are approximate unless dimensioned.
- B. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Where installation is inaccessible, install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaries. Coordinate locations and sizes of required access doors.
- C. Coordinate layout and installation of boxes to provide adequate headroom and working clearance. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- D. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems and where normal and emergency power circuits occur in the same box.
- E. Adjust box location up to 6 feet prior to rough-in to accommodate intended purpose.
- F. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- G. Locate and install boxes to maintain headroom and to present a neat appearance.

- H. Provide knockout closures for unused openings.
- I. Install boxes in walls without damaging wall insulation or reducing its effectiveness.
- J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. For outlet boxes in walls with combustible finished surfaces such as wood paneling or fabric wall coverings, position box to be flush with finished surface per NEC requirements.
- K. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes. Accurately position bridges to allow for surface finish thickness.
- Do not install flush mounted boxes back-to-back in walls; install with minimum 6 inches separation.
- M. Install with minimum 24 inches separation in fire rated walls. Limit penetrations in fire rated walls to 16 square inches each and a maximum total combined penetration area of 100 square inches in any given 100 square feet of wall. Where penetrations are in excess of these requirements provided UL listed fire stop wrap acceptable to Authority having Jurisdiction.
- N. Do not fasten boxes to ceiling support wires or other piping systems.
- O. Support boxes independently of conduit.
- P. Clean interior of boxes to remove dust, debris, and other material and clean exposed surfaces and restore finish.
- Q. Provide blank covers or plates for all boxes that do not contain devices.

3.4 INSTALLATION – BURIED CONDUITS

- A. Excavation and backfilling shall be in accordance with these specifications:
 - 1. Excavate and backfill as necessary for proper installation or work.
 - 2. Provide bracing and shoring as necessary or required.
 - 3. Compact backfill under footings, floor slabs and paving using materials and methods specified.
 - 4. All conduits outside the building perimeter shall be buried a minimum of 24 inches below grade. Bottom of trench shall be smoothed and all rocks and cobbles 3 inches and larger shall be removed. Conduits shall be bedded in a minimum of 2 inches of sand and shall have a cover of 2 inches minimum of sand. Trench shall be backfilled with non-frost susceptible material and compacted.
 - 5. Conduits below slab on grade shall be installed in the top 6 inches of classified material.
 - 6. Damage to existing underground utilities shall be repaired immediately by the Contractor at no cost to the Owner.

SECTION 26 05 48 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes requirements for vibration and seismic restraints for electrical equipment installed in seismic categories C, D, E or F.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 33 Raceway and Boxes for Electrical Systems.
- C. Section 26 05 29 Hangers and Supports for Electrical Systems.
- D. Section 26 05 33 Packaged Generator Assemblies.
- E. Section 26 36 23 Automatic Transfer Switches

1.3 DESCRIPTION

A. Provide seismic anchorage and restraint of electrical systems including, equipment, raceways, etc.

B. Seismic Category C:

- 1. Only electrical items that are of Importance Factor (Ip) = 1.5 are required to be seismically braced. This applies to the following:
 - a. The component is required to function for life safety purposes after an earthquake, including fire protection systems, fire alarm systems, emergency lighting, etc.
 - b. The component contains hazardous materials.
 - c. The component is in or attached to an Occupancy Category IV structure (Hospitals, fire station, police station, emergency shelters, etc. per ASCE 7-16, Table 1.5-1) and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.
- 2. All other electrical components shall be assigned a component importance factor Ip = 1.0 and are not required to be seismically braced.

C. Seismic Category D, E and F:

1. All electrical items that are of Importance Factor (Ip) = 1.5 are required to be seismically braced. This applies to the following:

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- a. The component is required to function for life safety purposes after an earthquake, including fire protection systems, fire alarm systems, emergency lighting, etc.
- b. The component contains hazardous materials.
- c. The component is in or attached to an Occupancy Category IV structure (Hospitals, fire station, police station, emergency shelters, etc. per ASCE 7-16, Table 1.5-1) and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.
- D. All other electrical equipment shall be assigned a component importance factor (Ip) = 1.0 and are required to be seismically braced unless one of the following conditions is satisfied:
 - 1. Component is MOUNTED (connection to structure) at less than 4' above the floor (to the center of gravity of the component), and weighs less than 400 lbs.
 - 2. Component is mounted higher than 4' (to the center of gravity of the component), but weighs less than 50 lbs (if it is concealed).
 - 3. Component is mounted higher than 4' (to the center of gravity of the component), but weighs less than 100 lbs (if it is exposed).
 - 4. Flexible connections between the components and associated conduit are provided.
 - 5. All runs or groupings of conduits on or off of trapezes shall be seismically braced, unless the distribution system (including conduit, wiring and fittings) weighs less than 5 pounds per linear foot.
- E. In accordance with ASCE 7-16 13.6.3, all electrical components with Ip = 1.5 shall also satisfy the following requirements:
 - 1. Provisions shall be made to eliminate seismic impact between components.
 - 2. Loads imposed on the components by attached utility or service lines that are attached to separate structures shall be evaluated.
 - 3. Batteries on racks shall have wrap-around restraints to ensure that the batteries will not fall from the rack. Spacers shall be used between restraints and cells to prevent damage to cases. Racks shall be evaluated for sufficient lateral load capacity.
 - 4. Electrical control panels, and other items with slide-out components shall have a latching mechanism to hold the components in place.
 - 5. Electrical cabinet design shall comply with the applicable National Electrical Manufacturers Association (NEMA) standards. Cutouts in the lower shear panel that have not been made by the manufacturer and reduce significantly the strength of the cabinet shall be specifically evaluated.
 - 6. The attachments of additional external items weighing more than 100 lbs shall be specifically evaluated if not provided by the manufacturer.
 - 7. Where conduitor similar electrical distribution components are attached to structures that could displace relative to one another and for isolated structures where such components

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cross the isolation interface, the components shall be designed to accommodate the seismic relative displacements defined in ASCE 7-16 Section 13.3.2.

F. Unless otherwise exempted above, electrical component supports and the means by which they are attached to the component shall be designed for the Seismic Category they are installed in accordance with ASCE 7-16 Section 13.6.4.

1.4 REFERENCE STANDARDS

- A. Seismic anchorage and restraints shall be designed and installed in accordance with codes and standards as enforced by authorities having jurisdiction in Kenai, Alaska. Authorities shall include Owner's insurance company.
- B. Where applicable, building standards supersede those of other evaluation or listing agencies referenced in specification.
- C. International Building Code (IBC), Chapter 16 Structural Design.
- D. ASCE 7-16 Chapter 13 Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

1.5 SUBMITTALS

- A. Provide structurally engineered shop drawings for seismic restraint of all electrical equipment required by the International Building Code (IBC), Chapters 16, 17. Structural design shall be based on the Seismic Use Category and Seismic Design Category as designated in these chapters.
- B. Provide complete calculations, drawings, and details.
- C. Shop drawings shall be stamped by a professional engineer registered in the State of Alaska.
- D. Submittals shall be coordinated with building Structural engineer.
- E. Submit for approval, seismic restraint calculations, drawings and details to authorities having jurisdiction as required by those authorities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials and devices shall be in accordance with applicable codes and standards and shall be appropriate for intended use.
- B. Anchors and attachments to building structure or concrete pads shall be as approved by building Structural engineer.
- C. Seismic restraints used in conjunction with vibration isolators may consist of loose cables, telescoping pipes or box sections, angles or sections, flat plates used as limit stops or snubbers, or other types of housing used either integral with or separate from vibration isolators to accomplish necessary seismic restraint.

2.2 EQUIPMENT

Section 26 05 48
VIBRATION AND SEISMIC
CONTROLS FOR ELECTRICAL SYSTEMS

A. Equipment available with seismic rating shall be provided with rating applicable to seismic zone of project location.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Secure stationary equipment, raceways and equipment supports to structure, concrete bases, or special supports to provide protection against earthquakes and to restrain lateral or vertical movement. Where vibration isolators are used, seismic restraints shall be designed to limit lateral or vertical movement during earthquake without short-circuiting vibration isolation system.
- B. Coordinate seismic restraints with a Structural engineer and incorporate building Structural engineer's requirements.
- C. Seismic restraint methods and materials shall be supplementary to support devices specified in other sections of this specification and together shall serve as equipment support criteria.
- D. Installation of devices shall be in accordance with a seismic Structural engineer's drawings and details and in accordance with seismic guidelines.
- E. Coordinate installation of devices with other trades and incorporate their requirements.
- F. Modify raceway and equipment locations as required for seismic restraint system.
- G. Seismic restraint systems shall not interfere with installation of other building systems or access.

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates
- B. Tape Labels.
- C. Wire and Cable Markers.
- D. Underground Warning Tape.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems.
- D. Section 26 24 16 Panelboards.
- E. Section 26 27 26 Wiring Devices.
- F. Section 26 32 00 Packaged Generator Assemblies.
- G. Section 26 36 23 Automatic Transfer Switches.

1.3 SUBMITTALS

- A. Section 26 05 00 Common Work Results for Electrical.
- B. Product Data:
 - 1. Submit manufacturer's catalog literature for each product required.
 - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color-coding, tag number, location, and function.

1.4 CLOSEOUT SUBMITTALS

1.5 ENVIRONMENTAL REQUIREMENTS

A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved white letters on black background. Nameplate for service disconnect shall be engraved white letters on red background.
- B. Letter Size:
 - 1. 1/4-inch high letters for identifying individual panel or equipment.
 - 2. 1/8-inch high letters for remaining lines with 1/8 inch spacing between lines.
- C. Minimum nameplate size: 1/8 inch thick with a consistent length and height for each type of nameplate wherever installed on the project.

2.2 TAPE LABELS

- A. Product Description: Adhesive tape labels, with 3/16 inch Bold Black letters on clear background made using Dymo Rhino series label printer or approved equal.
- B. Embossed adhesive tape will not be permitted for any application.

2.3 WIRE AND CABLE MARKERS

- A. Power Description: Machine printed heat-shrink tubing, cloth or wrap-on type, for all neutrals and Phase conductors.
- B. Low Voltage System Description: Self-adhesive machine printed label with unique wire number that is shown on shop drawing for system.

2.4 UNDERGROUND WARNING TAPE

- A. Product Description: Red, 6-inch wide, detectable.
- B. Wording to read "Caution Buried Electric Line Below".

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Degrease and clean surfaces to receive nameplates and tape labels.
- B. Install nameplates and tape labels parallel to equipment lines.
- C. Underground Warning Tape Installation: Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

3.2 NAMEPLATE INSTALLATION

- A. Secure nameplates to equipment fronts using machine screws tapped and threaded into panelboard, generator breaker and automatic transfer switch or using rivets. The use of adhesives is not acceptable. Machine screws to not protrude more than 1/16 inch on back side.
- B. Disconnects, Starters, or Contactors:
 - 1. Provide nameplate for each device with the following information:

- a. Line 1: Load served.
- b. Line 2: Panelboard and circuit number from which the device is fed.
- c. Line 3: Circuit amperage and poles.

3.3 LABEL INSTALLATION

- A. Conduit Feeder Labels Provide conduit labels on all feeder raceways as follows:
 - 1. Panelboards "PANEL xxxx FED FROM xxx".
- B. Spare Raceways: Provide raceway label on each individual raceway denoting the source and termination point at each end.
- C. Low-Voltage System Device Labels: Provide label on each device, denoting device ID or address where applicable. Affix label to device faceplate for ceiling-mounted devices or wall-mounted devices above 8'-0" AFF. Affix label inside backbox for exterior devices.

3.4 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identification shall be as follows:
 - 1. Markers shall be located within one inch of each cable end, except at panelboards, where markers for branch circuit conductors shall be visible without removing panel deadfront.
 - 2. Each wire and cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations.
 - 3. Color code phases, neutral, and ground per NEC requirements and Section 26 05 19.
 - 4. Color-code all low-voltage system wires and cables in accordance with the individual sections in which they are specified.
 - 5. For power identify with branch circuit or feeder number.
 - 6. Control Circuits: Control wire number as indicated on schematic and shop drawings.
- B. Provide pull string markers at each end of all pull strings. Marker shall identify the location of the opposite end of the pull string.

3.5 JUNCTION BOX IDENTIFICATION

- A. Label each power junction box with the panelboard name and circuit number.
- B. For junction boxes above ceilings, mark the box cover with the circuit or system designation using permanent black marker. For junction boxes in finished areas, mark the inside of the cover with the circuit or system designation using permanent black marker.

3.6 DEVICE PLATE IDENTIFICATION

A. Label each receptacle device plate or point of connection denoting the panelboard name and circuit number.

B. Install adhesive label on the top of each plate.

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Branch Circuit Panelboards.
- B. Surge Protective Devices.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements, and Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- C. Section 26 05 53 Identification for Electrical Systems.
- D. Section 26 05 48 Vibration and Seismic Control for Electrical Systems.

E.

1.3 REFERENCES

- A. NEMA AB 1 Molded Case Circuit Breakers.
- B. NEMA PB 1 Panelboards.
- C. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- D. UL 50 Enclosures for Electrical Equipment.
- E. UL 67 Panelboards.
- F. UL 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures.
- G. Federal Specification W-C-375B/Gen Circuit Breakers, Molded Case, Branch Circuit and Service.

1.4 SUBMITTALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Product Data: Submit product data for all components provided which fall under this section showing configurations, finishes, and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.
- C. Shop drawings: Submit shop drawings for each panelboard indicating features and device arrangement and size. Include outline and support point dimensions, voltage, main bus ampacity, and integrated short circuit ampere rating.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Drawings: Submit final record panel schedules as hardcopy and in Microsoft Excel format. Submit under Section 26 05 00.
- B. Panel Schedules: Prior to Substantial Completion, submit copies of all panel schedules for review by the Owner. The Owner will note any changes to the room numbers/names and the Contractor shall provide revised typed panel schedules to reflect all changes, at no additional cost to the Owner.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Upon arrival at the site inspect equipment and report on any damage.
- C. Handle carefully on site to avoid any damage to internal components, enclosures and finishes.
- D. Store in a clean, dry environment. Maintain factory packaging and provide an additional heavy canvas or plastic cover to protect enclosures from dirt, water, construction debris and traffic.

1.7 WARRANTY

A. Manufacturer shall warrant specified equipment to be free of defects for a period of one year from the date of installation.

1.8 SPARE PARTS

A. Keys: Furnish 2 each to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - PANELBOARDS

- A. Square D.
- B. Cutler Hammer.
- C. General Electric.
- D. Siemens.
- E. Substitutions: Under provisions of Division 01.

2.2 BRANCH CIRCUIT PANELBOARDS

- A. Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1 or 3R as indicated on Drawings. Boxes shall be galvanized steel constructed in accordance with UL50 requirements. Interiors shall be field convertible for top or bottom incoming feed. Interior leveling provisions shall be provided for flush mounted applications.
- C. Cabinet Size: 6 inches deep; 20 inches wide minimum.

- D. Provide flush or surface cabinet front as indicated on the Drawings with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- E. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide one continuous bus bar per phase each. Panelboards shall have sequentially phased branch circuit connectors suitable for bolt-on branch circuit breakers. Bussing shall be fully rated.
- F. Integrated Short Circuit Rating: Provide panelboards with short circuit ratings as shown on the Drawings. Minimum ratings shall be 10,000 amperes RMS symmetrical for 250 volt panelboards.
- G. Branch Circuit Breakers: NEMA AB 1; Provide panelboards with bolt-on type thermal magnetic trip circuit breakers.
 - 1. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free with common trip handle for all poles.
 - 2. Lugs shall be UL Listed to accept copper and aluminum conductors and shall be suitable for 90°C rated wire, sized according to the 75 °C temperature rating per NEC Table 310-16. Lug body shall be bolted in place.
 - 3. Provide circuit breakers UL listed as type HACR for use with heating, air conditioning and refrigeration equipment.
 - 4. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

2.3 PANELBOARD IDENTIFICATION

- A. For each new panelboard and each existing panelboard where circuits are added or modified, provide typed schedule denoting each circuit load by the load type and final name and room number actually in use in the facility. Schedule shall not be typed with names shown on the Contract Drawings unless names are acceptable to the Owner.
- B. All panelboards load centers shall have signage for arc hazard installed. The marking shall be located to be clearly visible to qualified personnel before examination, adjustment, servicing or maintenance of the equipment. At a minimum the signage shall state the following:

Warning

Arc Flash and Shock Hazard

Appropriate PPE Required

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1.
- B. Height: 6 feet, 6 inches to top of panelboard.
- C. Provide filler plates for unused spaces in panelboards.
- D. Panel Schedules: Revise schedules to reflect circuiting changes required to balance phase loads.

3.2 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Receptacles.
- B. Device Plates and Box Covers.

1.2 RELATED SECTIONS

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems.
- D. Section 26 05 53 Identification for Electrical Systems.

1.3 REFERENCE STANDARDS

- A. FS W-C-596 Federal Specification for Electrical Power Connector, Plug, Receptacle, and Cable Outlet.
- B. FS W-S-896 Federal Specification for Switches, Toggle (Toggle and Lock), Flush Mounted.
- C. NEMA WD 1 General Color Requirements for Wiring Devices.
- D. ANSI/NEMA WD 6 Wiring Devices Dimensional Requirement.
- E. UL 498 Attachment Plugs and Receptacles.
- F. UL 943 Ground-Fault-Circuit-Interrupters.

1.4 SUBMITTALS

A. Product Data: Submit product data for all components provided that are specified in this section showing configurations, finishes, and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - RECEPTACLES

- A. Hubbell.
- B. Leviton.
- C. Pass & Seymour.
- D. Arrow Hart.

E. Substitutions: acceptable.

2.2 RECEPTACLES

- A. Convenience and Straight-blade Receptacles: UL 498, ANSI/NEMA WD-6 and Federal Specification FS W-C-596 industrial grade receptacle.
- B. Convenience Receptacle Configuration: ANSI/NEMA WD-6; Type 5-20R, white nylon face.
- C. GFCI Receptacles: ANSI/NEMA WD-6; 20A, duplex convenience receptacle with integral class 'A' ground fault current interrupter, LED indicator lamp and integral lockout.
- D. Tamper-Resistant Receptacles: ANSI/NEMA WD-6; Complying with the requirements of UL 498 (section 131) and NEC 406.12-14.
- E. Weather-Resistant Receptacles: ANSI/NEMA WD-6; Listed to the weather-resistant supplement of UL498 and complying with the requirements of NEC 406.9.

2.3 DEVICE PLATES

- A. Decorative Cover Plate: Smooth 430 or 302 stainless steel with metal, counter sunk screws to match device plate.
- B. Weatherproof Cover Plate: UL listed, cast aluminum, hinged outlet cover/enclosure, with gasket between the enclosure and the mounting surface, suitable for wet locations while in use and identified as "Extra Duty" per NEC 406.9 (B)(1).
- C. Exposed Work Cover Plate: ½ inch raised, square, pressed, galvanized or cadmium plated steel cover plate supporting devices independent of the outlet box.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install convenience receptacles 18 inches above floor, 4 inches above counters or backsplash, grounding pole on bottom.
- B. Unless otherwise noted, mounting heights are for finished floor to center line of outlet.
- C. Install decorative plates on receptacle, and blank outlets in finished areas. Use midsize or jumbo plates for outlets installed in masonry walls, where required to cover up imperfections in the wall opening.
- D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- E. Install devices and wall plates flush and level.
- F. Ground receptacles to boxes with a grounding wire. Grounding through the yoke or screw contact is not an acceptable alternate to the ground wire.
- G. Install circuit label on each receptacle in accordance with Section 26 05 53.

SECTION 26 29 13 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual Motor Starters.

1.2 RELATED SECTIONS

- A. Section 26 05 48 Vibration and Seismic Controls for Electrical Systems
- B. Section 26 05 29 Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 Identification for Electrical Systems.

1.3 REFERENCES

- A. ANSI/NEMA ICS 6 Enclosures for Industrial Controls and Systems.
- B. NEMA AB 1 Molded Case Circuit Breakers.
- C. NEMA KS 1 Enclosed Switches.

1.4 SUBMITTALS

A. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include recommended maintenance procedures and intervals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

- A. Square D.
- B. Allen Bradley.
- C. Siemens.
- D. Cutler Hammer.
- E. Substitutions: Under provisions of Division 01.

2.2 MANUAL MOTOR STARTERS

A. Manual Motor Starter: NEMA ICS 2; size and number of poles as required by the load served, AC general-purpose Class A manually operated non-reversing full-voltage controller for induction motors rated in horsepower, with overload relay, red LED pilot light, NO auxiliary contact, and toggle operator.

- B. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose Class A manually operated, number of poles as required by the load served, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and toggle operator.
- C. Enclosure: ANSI/NEMA ICS 6; Type 1 or as indicated on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Select and install heater elements in motor starters to match installed motor characteristics.
- C. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
- D. After final connections are made, check and correct the rotation of all motors.

SECTION 263200 - PACKAGED GENERATOR ASSEMBLIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.02 SECTION INCLUDES

- A. Packaged natural gas engine generator system.
- B. Unit-mounted cooling system.
- C. Unit-mounted control and monitoring.
- D. Fuel system pump, controls and monitoring panel.
- E. Exhaust silencer and fittings.
- F. Batteries and charger.

1.03 RELATED SECTIONS

- A. Section 26 05 19 Low Voltage Electrical Power Conductors and Cables.
- B. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- C. Section 26 05 48 Vibration and Seismic Controls for Electrical Systems.
- D. Section 26 05 53 Identification for Electrical Systems.
- E. Section 26 24 16 Panelboards.
- F. Section 26 36 23 Automatic Transfer Switches.

1.04 REFERENCES

- A. ANSI/NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. ANSI/NEMA MG 1 Motors and Generators
- C. ANSI/NEMA AB 1 Molded Case Circuit Breakers.
- D. IEEE 446 Recommended Practice for Emergency Standby Power Systems for Commercial and Industrial Applications
- E. NPFA 70 National Electric Code

- F. NFPA 37 Installation and Use of Stationary Combustion Engines
- G. NFPA 110 Emergency and Standby Power Systems
- H. UL 2200 Stationary Engine Generator Assemblies

1.05 SYSTEM DESCRIPTION

- A. Packaged natural gas engine generator system in a weather protective, sound attenuated enclosure to provide source of standby power for the Kenai, Alaska.
- B. System Capacity: KW and KVA ratings as shown on the Drawings, at elevation of 300 feet above sea level and an ambient temperature between -4°F and 104°F.
- C. Separately provided automatic transfer switch suitable for use with generators. Reference Section 26 36 23.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 26 05 00 Common Work Results for Electrical and General Conditions and Supplementary Conditions to the Contract.
- B. Contractor to coordinate with manufacturer(s) to provide shop drawings showing dimensioned plan and elevation views, interconnection points, electrical schematic and interconnection diagrams for connecting new generator to new automatic transfer switch.
- C. Submit product data showing dimensions, weights, ratings, interconnection points and wiring diagrams for engine, generator, control panel, batteries, battery charger, and exhaust silencer.
- D. Submit manufacturer's installation instructions and Operation and Maintenance manuals to include normal operation, routing maintenance requirements, battery inspection and maintenance, system coolant and other fluid inspection and replacement, oil sampling and analysis for engine wear and emergency maintenance procedures. Provide service manuals for engine, generator, radiator.

1.07 PROJECT RECORD DRAWINGS

A. Submit record documents showing the accurate location of engine generator and all mechanical/electrical connections and routing. Provide as-builts of interconnection diagrams.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in packaged engine generator systems with a minimum five years of documented experience.
- B. Supplier: Authorized distributor of engine generator manufacturer with service facilities in Anchorage and authorized by the manufacturer to maintain and administer the warranty and employ factory certified mechanics to perform warranty work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products under provisions of General Conditions and Supplementary Conditions to the Contract.
- B. Deliver generator, transfer switch and all associated accessories to site for storage prior to installation.
- Accept packaged engine generator and all accessories on site in crates and verify no damage was incurred during shipping.
- D. Store and protect onsite from damage, dirt and moisture.

1.10 WARRANTY

- A. Supplementary Conditions: Product warranties and product bonds.
- B. Provide manufacturer's standard warranty for the generator, enclosure and transfer switch. Warranty shall include parts, labor, travel expenses and labor to remove/reinstall equipment.

1.11 EXTRA MATERIALS

- Submit maintenance materials list.
- B. Furnish a complete set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal tool box.
- C. Provide a one year supply of each fuel filter, oil filter, and air filter element required for the engine generator. The supply shall be based on filter changes performed at manufacturer's suggested maintenance intervals.

1.12 MAINTENANCE SERVICES

A. Furnish service and maintenance of packaged engine generator system for one year from the Date of Substantial Completion. The maintenance service shall include two semi-annual inspections and test run the engine to perform manufacturer's recommended preventative maintenance service on the equipment furnished.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - Generator and ATS must be from the same manufacturer.

- A. Generac as the Basis of Design.
- B. Cummins.
- C. Caterpillar.
- D. Kohler.

2.02 ENGINE

- A. Type: liquid-cooled, inline or V-type, four stroke cycle, ignition internal combustion engine.
- B. Rating: Standby power rated, sufficient to operate at 10 percent overload for one hour in 12 in accordance with ISO30461/1, AS2789, DIN6271 and BS5514 at specified elevation and ambient limits.
- C. Fuel System: natural gas.
- D. Engine Speed: 1800 rpm.
- E. Mounting: Provide unit with suitable rubber in shearvibration isolators between the unit and the structural steel base within the enclosure.
- F. Governor: Isochronous type to maintain engine speed within .5 percent steady state and 5 percent no load to full load, with recover to steady state within 2 seconds following sudden load changes.
- G. Safety Devices: Provide engine shutdown on high water temperature, high oil temperature, low oil pressure, overspeed, engine overcrank, low oil level and low water level. Limits to be selected by manufacturer.
- H. Engine Starting: Electric DC starting system capable of three complete cranking cycles without overheating. Starters shall have positive engagement, number and voltage of starter motors in accordance with manufacturer's instruction. Include remote starting control circuit with MANUAL-OFF-REMOTE selector switch on engine generator control panel.
- I. Engine Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 2 equipment for heater capacity and performance. Unit shall be designed for operation on a single 208 VAC, single-phase power connection and shall be prewired to enclosure panel. Heater shall be installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss. Provide with thermostat installed at the engine housing and prewired to the control system.
- J. Cooling System: Closed loop, liquid cooled. The generator set manufacturer shall provide prototype test data for the specific hardware proposed demonstrating that the machine will operate at rated standby load in an outdoor ambient condition of 40 deg C. Coolant shall be a solution of ethylene-glycol-based antifreeze and water to provide

freeze protection to a minimum of -40°F, with anticorrosion additives as recommended by engine manufacturer. Overflow tank size shall be adequate to contain expansion of total system coolant from cold start to 110 percent load condition. Expansion tank shall be constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock. Temperature control shall be self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

2.03 ENGINE ACCESSORIES

- A. Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instruction.
- B. Air Cleaner: Provide replaceable dry element air cleaner with restriction indicator.
- C. Water Pump: As selected by manufacturer.
- D. Lube Oil Pump: Engine/skid mounted, positive displacement, mechanical, full pressure pump.
- E. Lube Oil Filter and Strainer: As recommended by the engine manufacturer to provide adequate filtration for the prime mover to be used.
- F. Lube Oil Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without the use of pumps, siphons, special tools, or appliances.

2.04 GENERATOR

- A. ANSI/NEMA MG 1; three phase, three pole, reconnectable brushless synchronous generator with brushless exciter.
- B. Rating: KW and KVA ratings as shown on the Drawings at .8 power factor, Voltage as shown on the Drawings, 60Hz at 1800 rpm.
- C. Insulation: ANSI/NEMA MG 1, Class H.
- D. Temperature Rise: 105°C.
- E. Enclosure: ANSI/NEMA MG 1; open drip proof.
- F. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load.
- G. Transient Voltage Performance: Not more than 20 percent variation for 50 percent stepload increase or decrease. Voltage shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.
- H. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.

- I. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
- J. Transient Frequency Performance: Not more than 15 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.
- K. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
- L. Sustained Short-Circuit Current: For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.
- M. Start Time: Comply with NFPA 110, Level 2, system requirements.
- N. Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.
- O. Alternator: The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and not more than 3% in any single harmonic. Provide alternator with anti-condensation heater wired to enclosure panel.
- P. Alternator shall be capable of accepting full rated load in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.
- Q. Windings: Two-thirds pitch stator winding and fully linked armortisseur winding.
- R. Generator Leads: The generator leads shall be brought out and terminated on a unit-mounted generator circuit breakers, quantity and sizes as shown on the drawings. The generator leads shall have sufficient length to allow for any connection configuration.

2.05 ACCESSORIES

- A. Enclosure: Level 2 sound attenuated, weather protective, 14-gauge steel or aluminum housing. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Instruments, control, and battery system shall be mounted within enclosure.
- B. Enclosure Construction:
 - Hinged Doors: With padlocking provisions. Restraint/Hold back hardware to prevent door to keep door open at 180 degrees during maintenance. Rain lips over all doors.
 - 2. Exhaust muffler located within enclosure.
 - All hardware shall be stainless steel.

- 4. A weather protective enclosure shall be provided which allows the generator set to operate at full rated load with a static pressure drop equal to or less than 0.5 inches of water.
- 5. Inlet ducts shall include rain hoods.
- 6. Bottom of generator set shall be enclosed to prevent pest intrusion and recirculation of disharge air and/or improper cooling air flow.
- 7. Enclosure color white or other neutral color.
- C. Engine Cooling Airflow through Enclosure: Housing shall provide ample airflow for engine generator operation at rated load in an ambient temperature of 40 deg C.
- D. Enclosure Sound Performance: Reduce the sound level of the engine generator while operating at full rated load to a maximum of 64 dBA measured at any location 7 m from the engine generator in a free field environment.
- E. Enclosure Electrical Provisions: Package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. Provide the following components:
 - 1. Factory wired 120/208V connections to heaters, battery charger, controls, etc. shall be brought to junction boxes for ease of field wiring connections. Circuits shall be provided by the Contractor from an external panel to the junction boxes as shown on the Drawings.
- F. Exhaust Silencer: Selected with performance as required to meet sound requirements of the application (64db max at 7m), sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. The silencer shall be inside the enclosure.
- G. Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.
- H. Starting System: 12 or 24V, as recommended by the engine manufacturer: electric, with negative ground.
 - 1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum.
 - 2. Cranking Cycle: As required by NFPA 110 for level 2 systems.
 - 3. Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.
 - 4. Battery Compartment: Factory fabricated of metal with acid-resistant finish.
 - 5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
- I. Battery Charger: Dual-rate, 2.5-Amp, Static charger designed to float at 12 volts DC. Provide overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Charger shall provide relay contacts for fault conditions as required by NFPA 110. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amp, 120 VAC, 30 VDC for remote indication of:
 - 1. Loss of AC power: Red light.
 - 2. Low battery voltage: Red light.

- 3. High battery voltage: Red light.
- 4. Power on: Green light, no relay contact.
- J. Line Circuit Breakers: Quantity and size as shown on Drawings. NEMA AB 1 molded case circuit breakers on generator output with integral thermal trip in each pole; sized in accordance with ANSI/NFPA 70. Include battery-voltage operated shunt trip, connection to open circuit breaker on engine failure and connected to field provided remote generator shutdown. Mount units in enclosures to meet ANSI/NEMA 250, Type 2 requirements.
- K. Engine-Generator Control Panel: NEMA 250, Type 2 generator-mounted control panel enclosure with UL508 listed and labeled microprocessor based control, designed to provide automatic starting, monitoring and control functions. Include provision for padlock and provide the following equipment and features:
 - 1. Digital Frequency Meter: 45-65 Hz range, LED display.
 - 2. AC Output Digital Voltmeter: LED display, 2 percent accuracy, with phase selector switch.
 - 3. AC Output Digital Ammeter: LED display, 2 percent accuracy, with phase selector switch.
 - 4. AC Output Digital Kilowatt Meter: LED display, 2% accuracy.
 - 5. Output Voltage Adjustment: Via touchpad on control panel.
 - 6. Push-to-test indicator lamps, one each for low oil pressure shutdown, high water temperature shutdown, high oil temperature shutdown, overspeed shutdown, overcrank shutdown, low water shutdown, low oil pressure pre-alarm and high water temperature pre-alarm, battery charger malfunction, low water temperature, and low fuel level.
 - 7. Engine manual-off-remote selector switch.
 - 8. Engine running time meter.
 - 9. Oil pressure gauge.
 - 10. Water temperature gauge.
 - 11. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
 - 12. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions required by ANSI/NFPA 99.
 - 13. Overcrank protection with manual reset.
 - 14. Trouble horn with silencing switch, red indicating light and reset switch.
- L. Heaters: Provide manufacturer's recommended heaters with thermostatic controls to keep engine oil pan, engine block, batteries, generator controls, and generator windings within manufacturer's recommended temperature at -20°F. Prewire to junction boxes.

M. Mounting:

- 1. The complete engine/generator package shall be mounted on a common, self-supporting, low profile, structural steel skid base. The base shall extend from the rear end of the generator to the most forward point of the engine and shall be predrilled to accept up to a 4/0 AWG copper grounding conductor.
- 2. Install the generator assembly on a reinforced, concrete pad with manufacturer recommended anchor bolts. The concrete pad shall be a minimum of 8" thick, 12" wider and 12" longer than the generator assembly. The pad shall be constructed of maximum 4 inch slump, minimum 3000 psi 28 day compression strength concrete reinforced with minimum 8 gauge wire mesh. The pad shall be flat and level to within 0.5 inch. The Contractor shall provide Structurally Engineered shop drawings for the concrete pad.

3. Unless otherwise required by the Contractor's Structural Engineer, overexcavate the area for the concrete pad a minimum of 24 inches and backfill with non-frost susceptible fill compacted to a minimum of 95% maximum standard density per ASTM D 698.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that concrete pad is installed per Contractor provided Structurally Engineered shop drawings, surfaces are ready to receive work, and field dimensions are as shown within submittals. Ensure all conduits required to stub up through concrete pad are installed and located per manufacturer requirements.
- B. Verify that required utilities are available in proper locations and ready for use and all required utility agreements have been made prior to starting work (ie standby generator and open transition transfer switch agreements).
- C. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

- A. Install new generator, transfer switch, accessories and interconnections in accordance with manufacturer's instructions and as shown on the Drawings.
- B. Ground and bond generator and other electrical system components in accordance with NEC requirements and as shown on the Drawings.

3.03 FIELD QUALITY CONTROL

- A. Generator system testing shall be performed in accordance with NFPA 110 requirements for Level 2 Systems, namely Part 7.13. Coordinate scheduling of testing with Owner and Authority Having Jurisdiction a minimum of seven (7) days prior to testing.
- B. Perform the initial 1.5 hour on-site acceptance test utilizing all loads that are served by the EPSS, per NFPA 110 7.13.4.1. Record all values required within NFPA 110 7.13.4.1.4 (1) through (12).
- C. During the test record the following at 20 minute intervals:
 - 1. Kilowatts
 - 2. Amperes
 - Voltage
 - 4. Coolant temperature.
 - 5. Room temperature.
 - 6. Frequency.
 - 7. Oil Pressure
- D. Furnish records of tests to the Owner.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Provide authorized manufacturer representative to prepare, start, test, and adjust systems in accordance with this specification.
- B. Manufacturer's representative shall also provide a minimum 4-hour (per generator) onsite training for the Owner's personnel prior to project Final Completion. Coordinate onsite testing with Owner a minimum of 2-weeks in advance of scheduling.

3.05 ADJUSTING

A. Adjust generator output voltage and engine speed.

3.06 CLEANING

A. Clean engine and generator surfaces. Replace oil, oil filters and fuel filters after testing and commissioning.

END OF SECTION 26 32 00

SECTION 26 36 23 – AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Complete factory assembled Automatic Transfer Switch (ATS).

1.2 RELATED SECTIONS

- A. Section 26 05 53 Identification for Electrical Systems: Engraved Nameplates.
- B. Section 26 32 00 Packaged Generator Assemblies.

1.3 REFERENCES

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions and General Requirements and Section 26 05 00 Common Work Results for Electrical.
- B. NFPA 70 National Electrical Code.
- C. NFPA 110 Emergency and Standby Power Systems.
- D. NEMA ICS 1 General Standards for Industrial Control and Systems.
- E. NEMA ICS 2 Standards for Industrial Control Devices, Controllers, and Assemblies.
- F. NEMA ICS 6 Enclosures for Industrial Controls and Systems.
- G. NEMA ICS 10 Industrial Control and Systems: AC Transfer Switch Equipment.
- H. NEMA 250 (National Electrical Manufacturers Association) Enclosures for Electrical Equipment (1000 Volts Maximum).
- I. IEEE 446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
- J. IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Transfer Switching Equipment.
- K. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- L. UL 508 Industrial Control Equipment.
- M. UL1008 Standard for Transfer Switch Equipment.

1.4 SUBMITTALS

- A. Product Data: Provide catalog sheets showing voltage, switch size, ratings and size of switching devices, operating logic, short circuit ratings, dimensions, enclosure details and all option provided.
- B. Factory Test Report: Provide copy of factory operational test on the transfer switch prior to shipping from the factory. A certified test report shall be included in the packing list with the transfer switch. The test process shall include calibration of voltage sensors.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Indicate actual locations and mounting heights of transfer switches on the project record drawings. Submit under Section 26 05 00.

B. O&M Manuals:

- 1. Provide project adjusted shop drawings indicating the final wiring and terminations with the O&M manuals.
- 2. Provide printout or spreadsheet indicating final settings and adjusted values of the transfer switch.
- 3. Include instructions for operating equipment. Include instructions for operating equipment under emergency conditions when engine generator is running.
- 4. Include routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience. Manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation and service in accordance with ISO 9001.
- B. Supplier: Authorized distributor of specified manufacturer with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Conform to requirements of NFPA 110 for a Level 2 system.
- C. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as instructed by manufacturer.

1.10 MAINTENANCE SERVICE

A. Furnish service and maintenance of transfer switch for one year from Date of Substantial Completion.

1.11 WARRANTY

A. Provide three-year manufacturer warranty of all components, parts, and assemblies against defects in materials and workmanship, with no deductible for all components.

PART 2 - PRODUCTS

- **2.1 MANUFACTURERS** Generator and ATS must be from the same manufacturer.
 - A. Generac.
 - B. Cummins/Onan.
 - C. Kohler.
 - D. Caterpillar.
 - E. Substitutions: acceptable.

2.2 AUTOMATIC TRANSFER SWITCH

- Description: NEMA ICS 2, UL 1008 listed, NEMA 3R rated, bypass isolation automatic transfer switch.
- B. Configuration: Double throw, electrically operated, electrically and mechanically interlocked and mechanically held transfer switch. The transfer switch shall be specifically designed so that it cannot stop in a neutral position.
- C. Open Transition type.
- D. Bypass-Isolation Switch:
 - 1. A two-way bypass-isolation switch shall provide manual bypass of the load to either source and permit isolation of the automatic transfer switch from all source and load power conductors. All main contacts shall be manually driven.
 - 2. Power interconnections shall be silver-plated copper bus bar. The only field installed power connections shall be at the service and load terminals of the bypass-isolation switch. All control interconnecting wiring shall be provided with disconnect plugs.
 - 3. Separate bypass and isolation handles shall be utilized to provide clear distinction between the functions. Handles shall be permanently affixed and operable without opening the enclosure door. Designs requiring insertion of loose operating handles or opening of the enclosure door to operate are not acceptable.
 - 4. Bypass to the load-carrying source shall be accomplished with no interruption of power to the load (make before break contacts). Designs which disconnect the load when bypassing are not acceptable. The bypass handle shall have three operating modes: "Bypass to

Normal," "Automatic," and "Bypass to Emergency." The operating speed of the bypass contacts shall be the same as the associated transfer switch and shall be independent of the speed at which the manual handle is operated. In the "Automatic" mode, the bypass contacts shall be out of the power circuit so that they will not be subjected to fault currents to which the system may be subjected.

- 5. The isolation handle shall provide three operating modes: "Closed," "Test," and "Open." The "Test" mode shall permit testing of the entire emergency power system, including the automatic transfer switches with no interruption of power to the load. The "Open" mode shall completely isolate the automatic transfer switch from all source and load power conductors. When in the "Open" mode, it shall be possible to completely withdraw the automatic transfer switch for inspection or maintenance to conform to code requirements without removal of power conductors or the use of any tools.
- 6. When the isolation switch is in the "Test" or "Open" mode, the bypass switch shall function as a manual transfer switch.
- 7. Designs requiring operation of key interlocks for bypass isolation or ATS's which cannot be completely withdrawn when isolated are not acceptable.

2.3 SERVICE CONDITIONS

- A. Service Conditions: NEMA ICS 1.
- B. Operating Temperature: minus 4°F to plus 140°F.
- C. Altitude: 300 feet.

2.4 RATINGS

- A. Furnish and install Automatic Transfer Switches with voltage, amperage, and number of switched poles as shown on project one-line drawing.
- B. Load Inrush Rating: Combination load.
- C. Continuous Rating: As noted on the Drawings.
- D. Interrupting Capacity: 250 percent of continuous rating.
- E. Withstand Current Rating: The switch shall be rated to withstand 22,000 RMS Symmetrical Amps. Transfer switch withstand ratings shall be applicable for ANY manufacturer's breakers. Withstand ratings utilizing specific manufacturer's breakers will only be accepted if coordinated in advance by the Contractor to ensure the existing/new breaker upstream of the transfer switch complies with the "specific breaker" listing.

2.5 PRODUCT OPTIONS AND FEATURES

- A. ATS Controls: Microprocessor controls with digital display for status information.
- B. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent interphase flashover.
- C. Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control

- system by means of locking disconnect plug(s) to allow the control system to be disconnected and service without disconnecting power from the transfer switch mechanism.
- D. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
- E. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch or the number and size of conductors shown on the drawings, whichever is larger.
- F. Operator Panel: Provide with a control panel to allow the operator to view the status and control the operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R that is permanently labeled for switch and control functions. The operator panel shall be provided with the following features and capabilities:
 - 1. High intensity LED lamps to indicate the source that the load is connected to and which sources are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control.
 - 2. High intensity LED lamps or control panel display to indicate that the transfer switch in "Not in Auto" and "Test/Exercise Active" to indicate that the control system is testing or exercising the generator set.
 - 3. "OVERIDE" pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation.
 - 4. "TEST" pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load.
 - 5. Security key switch or controller password protection to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless the key is in place and operated.
 - 6. Alphanumeric display panel with pushbutton navigation switches. The display shall be clearly visible in both bright (sunlight) and no light conditions. It shall be visible over an angle of at least 120 degrees. The alphanumeric display panel shall be capable of providing the following functions and capabilities:
 - a. Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen.
 - b. Display source status to indicate source is connected or not connected.
 - c. The display panel shall allow the operator to view and make the following adjustments in the control system after entering an access code:
 - 1) Set nominal voltage and frequency for the transfer switch.
 - 2) Adjust voltage and frequency sensor operation set points.
 - 3) Set up time clock functions.
 - 4) Set up load sequence functions.

- 5) Enable or disable control functions in the transfer switch, including program transition.
- 6) Set up exercise and load test operation conditions, normal system time delays for transfer time, time delay for start, stop transfer and retransfer.
- d. Display real time clock data, including date, and time in hours, minutes and seconds. The real time clock shall incorporate provisions for automatic daylight savings time and leap year adjustments. The control shall also log total operating hours for the control system.
- e. Display service history for the transfer switch. Display source connected hours to indicate the total number of hours connected to each source. Display number of times transferred and total number of times each source has failed.
- G. Provide RMS voltage sensing and metering that is accurate to within plus or minimum 1% of nominal voltage level. Frequency sensing shall be accurate to within plus or minus 0.2%. Voltage sensing shall be monitored based on the normal voltage at the site.
- H. Transfer switch voltage sensors shall be close differential type providing source availability information to the control system based on the following functions:
 - 1. Monitoring all phases of the normal source for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage leave and dropout in a range of 75 to 98% of normal voltage level).
 - 2. Monitoring all phases of the standby source for under voltage conditions (adjustable for pickup in a range of 85 to 98% of the normal voltage leave and dropout in a range of 75 to 98% of pickup voltage level).
 - 3. Monitoring all phases of the normal and standby sources for voltage imbalance.
 - 4. Monitoring all phases of the normal and standby sources for loss of a single phase.
 - 5. Monitoring all phases of the normal and standby sources for phase rotation.
 - 6. Monitoring all phases of the normal and standby sources for over voltage conditions (adjustable for dropout over a range of 105 to 135% or normal voltage and pickup at 95 99% of dropout voltage level).
 - 7. Monitoring of all phases of the normal and standby sources for over or under frequency conditions.
- Communications Module: The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0 6 seconds, set at 5 seconds); transfer (adjustable in a range from 0 120 seconds, set at 2 seconds); retransfer (adjustable in a range from 0 30 minutes, set at 5 minutes); and generator stop (cool down) (adjustable in a range of 0 30 minutes, set at 5 minutes).
- J. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs to provide optimum protection form line voltage surges, RFI and EMI.
- K. The transfer switch shall provide an isolated relay contact for starting of the generator set. The relay shall be normally held open, and close to start the generator set. Output contacts shall be form C.

- L. Provide one set of Form C auxiliary contacts on both sides operated by transfer switch position, rated 10 Amps. 250 VAC.
- M. Generator set exercise (test) with load mode: The control system shall be configurable to test the generator set under load. In this mode the transfer switch shall control the generator set in the following sequence:
 - 1. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program or when manually initiated by the operator.
 - 2. When the control system senses the generator set at rated voltage and frequency it shall operate to connect the load to the generator set.
 - The generator set shall operate connected to the load for the duration of the exercise period. If the generator set fails during this period the transfer switch shall automatically reconnect the load to the normal source.
 - 4. At the completion of the exercise period the transfer switch shall operate to connect the load to the normal source.
 - 5. The transfer switch shall operate the generator set unloaded for the programmed cool down period and then remove the start signal from the generator set. If the normal source fails at any time when the generator set is running the transfer switch shall immediately connect the load to the generator set.
- N. Generator set exercise (test) without load mode: The control system shall be configurable to test the generator set without transfer switch load connected. In this mode the transfer switch shall control the generator set in the following sequence:
 - 1. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program or when manually initiated by the operator.
 - 2. When the control system senses the generator set at rated voltage and frequency it shall operate the generator set unloaded for the duration of the exercise period.
 - 3. At the completion of the exercise period the transfer switch shall remove the start signal from the generator set and shut the generator down. If the normal source fails at any time when the generator set is running the transfer switch shall immediately connect the load to the generator set.

2.6 ENCLOSURE

- A. Enclosure shall be ICS 10 and UL listed NEMA 3R. The enclosure shall provide wire bend space in compliance to the latest version of NFPA 70. The cabinet door shall include permanently mounted key type latches.
- B. Enclosure shall be configured to require front access only for maintenance
- C. Manual operating handles and all control switches (other than key operated switches) shall be accessible to authorized personnel only by opening the key locking cabinet door.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surface is suitable for transfer switch installation.

3.2 INSTALLATION

- A. Install transfer switches in accordance with manufacturer's instructions.
- B. Provide engraved plastic nameplates under the provisions of Section 26 05 53.
- C. Provide start-up control signal wiring between transfer switch and standby diesel generator system to start generator upon local loss of power.
- D. All transfer switches shall have signage for arc hazard installed. The marking shall be located to be clearly visible to qualified personnel before examination, adjustment, servicing or maintenance of the equipment. At a minimum the signage shall state the following:

Warning

Arc Flash and Shock Hazard

Appropriate PPE Required

3.3 MANUFACTURER'S SERVICES

A. The transfer switch manufacturer shall perform a complete operational test on the transfer switch prior to shipping from the factory. A certified test report shall be included in the packing list with the transfer switch. The test process shall include calibration of voltage sensors.

3.4 DEMONSTRATION

- A. Visual and Mechanical Inspection:
 - 1. Compare equipment nameplate data with drawings and specifications.
 - 2. Inspect physical and mechanical condition.
 - 3. Verify manual transfer warnings are attached and visible.
 - 4. Verify tightness of control connections.
 - 5. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data.
 - 6. Perform manual transfer operation.
 - 7. Verify positive mechanical interlocking between normal and alternative sources.
 - 8. Inspect anchorage, alignment, grounding and required clearances.

B. Electrical Tests:

- 1. Measure contact-resistance.
- 2. Perform insulation-resistance tests, phase-to-phase and phase-to-ground, with switch in both source positions. Test duration shall be one minute. Use a test voltage in accordance

with manufacturer's published data. For control devices that cannot tolerate test voltage follow manufacturer's recommendation.

- 3. Verify settings and operation of control devices.
- 4. Calibrate and set relays and timers in accordance with manufacturer's published data.
- 5. Verify phase rotation, phasing and synchronized operation as required by the application.
- 6. Perform automatic transfer tests:
 - a. Simulate loss of normal power.
 - b. Return to normal power.
 - c. Simulate loss of emergency power.
 - d. Simulate all forms of single-phase conditions.
- 7. Verify correct operation and timing of following functions:
 - a. Normal source voltage-sensing relays.
 - b. Engine start sequence.
 - c. Time delay upon transfer.
 - d. Alternate source voltage-sensing relays.
 - e. Automatic transfer operation.
 - f. Interlocks and limit switch function.
 - g. Time delay and retransfer upon normal power restoration.
 - h. Engine cool down and shutdown feature.

END OF SECTION

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SCOPE

A. All provisions of the Contract including the General and Supplementary Conditions and the General Requirements apply to this work.

1.2 WORK INCLUDED

- A. The work to be included in these and all other mechanical subsections shall consist of providing, installing, adjusting, and setting into proper operation complete and workable systems for all items shown on the drawings, described in the specifications or reasonably implied. This shall include the planning and supervision to coordinate the work with other crafts and to maintain a proper time schedule for delivery of materials and installation of the work.
- B. Division 01 of the specifications is to be specifically included as well as all related drawings.

1.3 RELATED WORK

- A. Related Work Specified Elsewhere:
 - 1. Fire Suppression Specifications: Division 21.
 - 2. Plumbing Specifications: Division 22.
 - 3. Electrical Specifications: Division 26.
 - 4. Motors and Connections: Division 26.
 - 5. Starters and Disconnects: Division 26.
- B. Unless otherwise indicated on the electrical drawings or the electrical schedules, provide all mechanical equipment motors, motor starters, thermal overload switches, control relays, time clocks, thermostats, motor operated valves, float controls, damper motors, electric switches, electrical components, wiring and any other miscellaneous Division 23 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical plans.
- C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.4 REFERENCED CODES - LATEST ADOPTED EDITION

- A. NFPA 13 Installation of Sprinkler Systems.
- B. NFPA 70 National Electrical Code (NEC).
- C. IMC International Mechanical Code.

D. UPC Uniform Plumbing Code.

E. IECC International Energy Conservation Code.

F. IFC International Fire Code.

G. IFGC International Fuel Gas Code.

H. IBC International Building Code.

1.5 PROJECT RECORD DRAWINGS

- A. In addition to other requirements of Division 01, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building. Show exact dimensions of buried piping off of columns or exterior walls.
- B. Maintain record documents at job site in a clean, dry, and legible condition. Keep record documents available for inspection by the Project Manager.
- C. Show the location of all valves and their appropriate tag identification.
- D. At completion of project, deliver these drawings to the Owner and obtain a written receipt.

1.6 SUBMITTALS

- A. See General Conditions and the General Requirements in Division 01 regarding submittals.
- B. Submit by specification section complete and all at one time; partial submittals will not be considered. Submittals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories in order of the Specification Sections. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications
- C. Catalog sheets shall be complete and the item or model to be used shall be clearly marked and identified as to which item in the specifications or on the drawings is being submitted and with drawing fixture number where applicable.
- D. Only submit on items specifically required by each specification section. If a submittal has not been requested, it will not be reviewed.
- E. Submit product data for:
 - 1. Hangers and Supports for HVAC Piping and Equipment.
 - 2. Identification for HVAC Piping, Ductwork and Equipment.

1.7 OPERATING AND MAINTENANCE MANUALS

- A. See General Conditions and the General Requirements in Division 01 regarding Operating and Maintenance Manuals.
- B. Submit maintenance manuals to the Engineer covering all equipment, devices, etc. installed by the Contractor.
- C. The operation and maintenance manuals shall be submitted by specification section complete and all at one time; partial operations and maintenance manual submittals will not be considered. The Operation and Maintenance Manuals shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed under basic categories. An index shall be included with bookmarks and identifying tabs between sections and references to sections of specifications. The manual shall contain, but not limited to, the following types of information:
 - 1. Cover sheet with name, address, telephone number of Contractor, General Contractor, and major equipment suppliers.
 - 2. Catalog cuts of all equipment, etc. installed (Marked to identify the specific items used).
 - 3. Manufacturer's maintenance and overhaul instruction booklets including exploded views.
 - 4. Identification numbers of all parts and nearest sources for obtaining parts and services.
 - 5. Reduced scale drawings of the control system and a verbal description of how these controls operate.
 - 6. A copy of the final test and balance report.
 - 7. A copy of valve schedule and reduced scale drawings showing valve locations.
 - 8. Written summary of instructions to Owner.
 - 9. All manufacturers' warranties and guarantees.
 - 10. Contractors Warranty Letter.
- D. A periodic maintenance form that includes all of the equipment shall be provided with the maintenance manual. The form shall list each piece of equipment and how often maintenance is required (daily, weekly, monthly, annually). Opposite each task shall be squares for check-off for a full year (initials) to verify that the tasks are being done.

1.8 HANDLING

- A. See General Conditions and the General Requirements in Division 01 regarding material handling.
- B. Deliver packaged materials to job site in unbroken packages with manufacturer's label, and store to facilitate inspection and installation sequence. All items must be labeled and identified as to make, size and quality.

1.9 SUBSTITUTIONS

- A. See General Conditions and the General Requirements in Division 01 for substitution request procedures.
- B. In accordance with the General Conditions and the General Requirements in Division 01, Substitution and Product Options, all substitute items must fit in the available space, and be of equal or better quality including efficiency performance, size, and weight, and must be compatible with existing equipment. The Owner shall be the final authority regarding acceptability of substitutes.

1.10 DIMENSIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the drawings.
- B. Any differences, which may be found, shall be submitted to the Owner for consideration before proceeding with the work.

1.11 MANUFACTURER'S DIRECTIONS

A. All manufactured articles shall be applied, installed, and handled as recommended by the manufacturer, unless specifically called out otherwise. Advise the Architect/Engineer of any such conflicts before installation.

1.12 PERMITS, FEES, ETC.

A. The Contractor under each Division of these specifications shall arrange for a permit from the local authority. The local authority will provide initial payment for inspection fees associated with the building permit. The Contractor shall pay for all other inspection fees and all reinspection fees or other fees and charges required by ordinance, law, codes, and these specifications.

1.13 TESTING

A. The Contractor under each section shall perform the various tests as specified and required by the Architect, Engineer and as required by applicable code, the State and local authorities. The Contractor shall furnish all labor, fuel, and materials necessary for making tests.

1.14 TERMINOLOGY

- A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed, and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.
- B. Where a material is described in detail, listed by catalogue number, or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.

- C. The use of the word "shall" conveys a mandatory condition to the contract.
- D. "This section" refers to the section in which the statement occurs.
- E. "The project" includes all work in progress during the construction period.
- F. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.15 SCHEDULE OF WORK

A. The work under the various sections must be expedited and close coordination will be required in executing the work. The various trades shall perform their portion of the work at such times as directed so as to meeting scheduled completion dates, and to avoid delaying any other trade. The Architect will set up completion dates. Each contractor shall cooperate in establishing these times and locations and shall process work so as to ensure the proper execution of it.

1.16 COOPERATION AND CLEANING UP

- A. The Contractor for the work under each section of the specifications shall coordinate the Contractors work with the work described in all other sections of the specifications to the end that, as a whole, the job shall be a finished one of its kind and shall carry on the work in such a manner that none of the work under any section of these specifications shall be handicapped, hindered or delayed at any time.
- B. At all times during the progress of the work, the Contractor shall keep the premises clean and free of unnecessary materials and debris. The Contractor shall, on direction at any time from the Architect, clear any designated areas or area of materials and debris. On completion of any portion of the work, the Contractor shall remove from the premises all tools and machinery and all debris occasioned by the work, leaving the premises free of all obstructions and hindrances.

1.17 WARRANTY

A. Unless a longer warranty is hereinafter called for, all work, materials and equipment items shall be warrantied for a period of two years after Substantial Completion and turn over to Owner. All defects in labor and materials occurring during this period, as determined by the Architect/Engineer, shall be repaired and/or replaced to the complete satisfaction of the Architect/Engineer. Guarantee shall be in accordance with Division 01.

1.18 COMPLETION REQUIREMENTS

- A. In accordance with the General Conditions and the General Requirements in Division 01, Project Closeout; before acceptance and final payment, the Contractor shall furnish:
 - 1. Accurate project record drawings, shown in red ink on prints, showing all changes from the original plans made during installation of the work.
 - 2. Contractors Two Year Warranty.

- 3. All Manufacturers' Guarantees.
- 4. Test and Balance Reports.
- 5. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing plumbing and mechanical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.20 RELOCATION OF EXISTING INSTALLATIONS

A. There are portions of the existing plumbing, mechanical and electrical systems, which shall remain in use to serve the finished building in conjunction with the indicated new installations. By actual examination at the site, each bidder shall determine those portions of the remaining present installations, which must be relocated to avoid interference with the installations of new work of the Contractors particular trade and that of all other trades. All such existing installations, which interfere with new installations, shall be relocated by the Contractor.

1.21 SALVAGE MATERIALS

- A. The Contractor shall remove existing equipment, duct, grilles, and other items associated with the mechanical systems where no longer required for the project. Where such items are exposed to view or uncovered by any cutting or removal of general construction and has no continuing function (as determined by the Architect/Engineer), they shall be removed.
- B. All items or materials removed from the project shall be made available for the Owner's inspection. The Owner retains the option to claim any item or material. Contractor shall deliver any claimed item or material in good condition to the place designated by the Owner. All items not claimed become the property of the contractor and shall be removed from the site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All equipment shall be regularly cataloged items of the manufacturer and shall be supplied as a complete unit in accordance with the manufacturer's standard specifications along with any optional items required for proper installation unless otherwise noted. Maintain manufacturer's identification, model number, etc. on all equipment at all times.
- B. Where more than one of an item is to be provided, all of the items shall be identical manufacture, make, model, color, etc.

2.2 RESTRICTED MATERIALS

- A. No materials containing asbestos in any form shall be allowed.
- B. No solder or flux containing lead shall be used on this project.
- C. Where materials or equipment provided by this Contractor are found to contain restricted materials, such items shall be removed and replaced with non-restricted materials items. Entire cost of restricted materials removal and disposal and cost of installing new items shall be the responsibility of the Contractor for those restricted materials containing items installed by the Contractor.

2.3 ELECTRICAL MOTORS

- A. Motors: Furnish electric motors designed for the specific application and duty applied, and to deliver rated horsepower without exceeding temperature ratings when operated on power systems with a combined variation in voltage and frequency not more than + 10% of rated voltage. Motors for pumps and fans shall be selected to be non-overloading.
- B. Verify from the drawings and specifications the available electrical supply characteristics and furnish equipment that will perform satisfactorily under the conditions shown and specified.
- C. All motors for use with equipment with variable frequency drives shall be inverter ready motors. Verify compatibility and sizing of motor with variable frequency drive.
- D. Size motors for 1.15 service factor and not to exceed 40° C temperature rise above ambient.
- E. Fractional horsepower motors to have self-resetting thermal overload switch.
- F. Provide Premium Efficiency, motors for all three phase motors one horsepower and larger. Standard efficiency motors will not be acceptable.

2.4 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

- A. Plastic Nameplates: Laminated plastic with engraved letters.
- B. Plastic Tags: Laminated plastic with engraved letters, minimum 1-1/2 inches diameter.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.5 PIPE HANGERS AND SUPPORTS

- A. Acceptable Manufacturers:
 - Anvil.
 - 2. PHD Manufacturing, Inc.

- 3. Michigan Hanger Company.
- 4. B-Line Systems, Inc.

B. Hydronic Piping:

- 1. Conform to ANSI/MSS SP58.
- 2. Hangers for Pipe Sizes ½ to 1-½ Inch: Malleable iron, adjustable swivel, split ring for steel pipe, copper swivel for copper pipe.
- 3. Hangers for Hot Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 2 Inches and Larger: Carbon steel, adjustable, clevis.
- 4. Multiple or Trapeze Hangers: Steel channels or strut with hanger rods. Cast iron roll and stand for hot pipe sizes 6 inches and over.
- 5. Wall Support for Pipe Sizes to 3 Inches: Strut triangular bracket with pipe clamp and cushion insulator.
- 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.
- 7. Vertical Support: Steel riser clamp.
- 8. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange or steel support.
- 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated with felt isolation pad or all copper ring or swivel.
- C. Shield for Insulated Piping 1-½ Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180° segments, minimum 12 inches long at pipe support.
- D. Shield for Insulated Piping 2 Inches and Larger: Hard block, calcium silicate insert, 180° segment, 12 inch minimum length, block thickness same as insulation thickness, flame resistant vapor barrier covering and 18 gauge galvanized shield.
- E. Shields for Vertical Copper Pipe Risers: Galvanized steel pipe.
- F. Design hangers to allow installation without disengagement of supported pipe.
- G. Copper Plating: All hanger elements in metal-to-metal contact with copper pipe, except hanger rings with factory-applied 1/16 inch minimum thick plastic or tape cushion strip over all contact surfaces.
- H. Strut Type Pipe Hanging System: Unistrut P-1000 series; framing members shall be No. 12 gage formed steel channels, 1-5/8 inch square, conforming to ASTM A 653 GR33, one side of channel shall have a continuous slot with inturned lips; framing nut with grooves and spring 1/2 inch size, conforming to ASTM 675 GR60; screws conforming to ASTM A 307; fittings conforming to ASTM A 575; all parts enamel painted or electro-galvanized.

2.6 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, or continuous threaded.

2.7 ANCHOR BOLTS

A. Anchor (Expansion) Bolts: Shall be carbon steel to ASTM A 307; nut shall conform to ASTM A194; shall be drilled-in type. Design values for shear and tension shall be not more than 80 percent of the allowable load.

2.8 EQUIPMENT CURBS

- A. Fabricate curbs of concrete, unless specifically called out otherwise.
- B. Friction from gravity loads shall not be considered resistance to seismic forces.

2.9 SEISMIC BRACING COMPONENTS

- A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.
 - 1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33.
 - 2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33.
 - 3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
 - 4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS. Gr.33.
 - 5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

PART 3 - EXECUTION

3.1 DRAWINGS

A. The drawings are partly diagrammatic, not necessarily showing all offsets or exact locations of piping and ducts, unless specifically dimensioned. The contractor shall provide all materials and labor necessary for a complete and operable system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Electrical Drawings. Coordinate work under this section with that of all related trades.

3.2 INSTALLATION

A. All work shall comply with the latest adopted applicable codes and ordinances including, but not limited to, the IMC, UPC, IBC, NEC, NFPA, IECC, IFGC and IFC Standards; all local and state amendments to all codes and standards.

- B. Obtain and pay for all inspection fees, connection charges and permits as a part of the Contract.
- C. Compliance with codes and ordinances shall be at the Contractor's expense.
- D. Install in accordance with manufacturer's instructions.

3.3 MEASUREMENTS

- A. Verify all measurements on the job site.
- B. Locate all equipment on the centers of walls, openings, spaces, etc., unless specified otherwise.
- C. Check all piping, ducts, etc. to clear openings.
- D. Rough-in dimensions shall be per manufacturer's recommendations and in compliance with current ADA and ANSI 117.1 standards.

3.4 OPERATING INSTRUCTIONS

- A. Before the facility is turned over to the Owner, instruct the Owner or Owner's personnel in the operation, care and maintenance of all systems and equipment under the jurisdiction of the Mechanical Division. These instructions shall also be included in a written summary in the Operating Maintenance Manuals.
- B. The Operation and Maintenance Manuals shall be utilized for the basis of the instruction. Provide a minimum of four hours of onsite instruction to the owner designated personnel.
- C. When required by individual specification sections provide additional training on HVAC systems and equipment as indicated in the respective specification section.
- D. Provide schedule for training activities for review prior to start of training.

3.5 SYSTEM ADJUSTING

- A. Each part of each system shall be adjusted and readjusted as necessary to ensure proper functioning of all controls, proper air distribution, elimination of drafts, noise, and vibration.
- B. Balance air and water systems for volume quantities shown and as required to ensure even temperature and the elimination of drafts. Balancing shall be done by a qualified firm acceptable to the Engineer. Provide balancing log to the Engineer before substantial completion.

3.6 CUTTING, FITTING, REPAIRING, PATCHING AND FINISHING

A. Arrange and pay for all cutting, fitting, repairing, patching, and finishing of work by other trades where it is necessary to disturb such work to permit installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

- B. Avoid cutting, insofar as possible, by setting sleeves, frames, etc. and by requesting openings in advance. Assist other trades in securing correct location and placement of rough-frames, sleeves, openings, etc. for ducts and piping.
- C. Cut all holes neatly and as small as possible to admit work. Include cutting where sleeves or openings have been omitted. Perform cutting in a manner so as not to weaken walls, partitions, or floors. Drill holes required to be cut in floors without breaking out around holes.

3.7 PAINTING

- A. Perform all of the following painting in accordance with provisions of Division 09 with colors as selected by the Architect. Provide the following items as a part of mechanical work:
 - 1. Factory applied prime and finish coats on mechanical equipment.
 - 2. Pipe identification where specified.
- B. If factory finish on any equipment furnished is damaged in shipment or during construction, refinish to equal original factory finish.

3.8 IDENTIFICATION

- A. Tag all valves with heat resistant laminated plastic labels or brass tags engraved with readily legible letters. Securely fasten to the valve stem or bonnet with beaded chain. Provide a framed, typewritten directory under glass, and installed where directed. Provide complete record drawings that show all valves with their appropriate label. Seton 250-BL-G, or 2961.20-G, 2" round or equal.
- B. Label all equipment with heat resistant laminated plastic labels having engraved lettering ½" high. If items are not specifically listed on the schedules, consult the Engineer concerning designation to use. Seton engraved Seton-Ply nameplates or equal.
- C. Identify piping to indicate contents and flow direction of each pipe exposed to view by a labeled sleeve in letters readable from floor at least once in each room and at intervals of not more that 20' apart and on each side of partition penetrations. Coloring scheme in accordance with ANSI A13.1-1981, Seton Opti-Code or equal.

3.9 PIPE HANGERS AND SUPPORTS

A. Support piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
½ to 1-¼ inch	6'-0"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"

Pipe Size	Max. Hanger Spacing	Hanger Diameter
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"

Notes:

- ^a See piping manufacturer installation instructions for additional requirements.
- B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-½ inch minimum vertical adjustment.
- E. Support vertical piping at every floor.
- F. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.

3.10 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of where shown on plans and where required by equipment manufacturer installation instructions.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Provide housekeeping pads of concrete, minimum 6 inches thick and extending 6 inches beyond supported equipment anchors.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.
- E. Anchor (Expansion) Bolts: Install anchor bolts for all mechanical equipment, piping and ductwork as required. Tightly fit and clamp base-supported equipment anchor bolts at all equipment support points. Provide locknuts where equipment, piping, and ductwork is hung. Install anchor (expansion) bolts in holes drilled in concrete where necessary to hang piping or ductwork, or to anchor stationary equipment from existing concrete slabs.

3.11 FLASHING

- A. Provide flexible flashing and metal counter-flashing where piping penetrate weather or waterproofed walls, floors, and roofs.
- B. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.12 SEISMIC RESTRAINT

A. General:

- All equipment, piping and ductwork shall be restrained to resist seismic/wind forces per the applicable building code(s) as a minimum. Restraint attachments shall be made by bolts, welds, or a positive fastening method. Friction shall not be considered. All attachments shall be proven capable of accepting the required wind load by calculations. Additional requirements specified herein are included specifically for this project.
- 2. Install seismic and wind restraint devices per the manufacturer's submittals. Any deviation from the manufacturer's instructions shall be reviewed and approved by the manufacturer.
- 3. Attachment to structure for suspended equipment, pipe, and duct: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- 4. Wall penetrations may be used as bracing locations provided the wall can provide adequate resistance without significant damage.
- 5. Coordinate sizes and locations of cast-in-place inserts for post-tensioned slabs with seismic restraint manufacturer.
- 6. Provide hanger rod stiffeners where indicated or as required to prevent buckling of rods due to seismic forces.
- 7. Where rigid restraints are used on equipment, ductwork or piping, support rods for the equipment, ductwork or piping at restraint locations must be supported by anchors rated for seismic use. Post-installed concrete anchors must be in accordance with ACI 355.2.
- 8. Ensure housekeeping pads have adequate space to mount equipment and seismic restraint devices and shall also be large enough to ensure adequate edge distance for restraint anchor bolts to avoid housekeeping pad breakout failure.

B. Concrete Anchor Bolts:

- Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre- or post-tensioned tendons, electrical and telecommunications conduit, and gas lines.
- 2. Mechanical Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
- 3. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

4. Set anchors to manufacturer's recommended torque, using a torque wrench.

C. Equipment Restraints:

- 1. Seismically restrain equipment all equipment. Install fasteners, straps and brackets as required to secure the equipment.
- 2. Install seismic snubbers on HVAC equipment supported by floor-mounted, non-seismic vibration isolators. Locate snubbers as close as possible to vibration isolators and attach to equipment base and supporting structure as required.
- 3. Install neoprene grommet washers on equipment anchor bolts where clearance between anchor and equipment support hole exceeds 1/8" (3.2 mm).
- 4. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

3.13 INSTALLATION OF EQUIPMENT

- A. Unless otherwise indicated, mount all equipment and install in accordance with manufacturer's recommendations and approved submittals.
- B. Maintain manufacture recommended minimum clearances for access and maintenance.
- C. Where equipment is to be anchored to structure, furnish and locate necessary anchoring and vibration isolation devices.
- D. Furnish all structural steel, such as angles, channels, beams, etc. required to support all piping, ductwork, equipment, and accessories installed under this Division. Use structural supports suitable for equipment specified or as indicated. In all cases, support design will be based upon data contained in manufacturer's catalog.
- E. Openings: Arrange for necessary openings in buildings to allow for admittance and reasonable maintenance or replacement of all equipment furnished under this Contract.
- F. Access Doors: Provide as necessary for reasonable maintenance of all equipment valves, controls, etc.

END OF SECTION

SECTION 23 05 05 - SELECTIVE DEMOLITION FOR HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work specified in this Section includes the demolition, removal, and disposition of certain mechanical work.
- B. Drawings, the provisions of the Agreement, and Administrative Specification Sections apply to all work of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Owner in writing of conditions detrimental to the proper and timely completion of the work.
- B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 DEMOLITION, REMOVAL AND DISPOSITION

- A. Piping, Ductwork, Equipment, Control Wiring and Tubing To Be Removed: Remove all piping, ductwork, equipment, control wiring and tubing as indicated. Drawings do not show all existing piping, ductwork, equipment, control wiring and tubing which is to be removed. Unless indicated otherwise, where existing equipment has been removed, or its use replaced by new equipment, remove connecting piping and ductwork back to the branch in the main so that there will be no dead ends or unused pipe lines in mechanical spaces at completion.
- B. Materials To Owner: As indicated on the Drawings.
- C. Re-use Of Materials: Only where indicated on Drawings.
- D. Materials To Contractor: Materials shown or specified to be removed, other than the materials indicated to be turned over to Owner.
- E. Protect any active piping and/or wiring encountered; remove, plug or cap utilities to be abandoned. Notify the Owner of utilities encountered whose service is not known.
- F. Debris Removal: Existing materials removed and not reinstalled or turned over to the Owner shall be immediately removed from the site and disposed of by the Contractor.
- G. Repairs: Any portion of the facility damaged, cut back or made inoperable by this Contractor shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Architect.

END OF SECTION

SECTION 23 05 19 - METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pressure Gauges.
 - 2. Pressure Gauge Taps.
 - 3. Thermometers.

B. PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THE SECTION

- 1. Section 23 21 13 Hydronic Piping
- 2. Section 23 31 00 HVAC Ducts and Casings

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. Section 23 21 16 Hydronic Piping Specialties.

1.3 REFERENCE STANDARDS

- A. ASTM E1 Specification for ASTM Thermometers.
- B. ASTM E77 Verification and Calibration of Liquid-in-Glass Thermometers.
- C. AWWA C700 Cold Water Meters Displacement Type.
- D. AWWA C706 Direct Reading Remote Registration Systems for Cold Water Meters.
- E. ASTM E1 Standard Specification for ASTM Thermometers.

1.4 SUBMITTALS

- A. Product Data: Submit engineering data for each component, include list which indicates use, operating range, total range, and location for manufactured components.
- B. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual location of all instrumentation and gauges.
- B. Operation and Maintenance Data.

1.6 WARRANTY

A. Furnish one year manufacturer warranty for HVAC instrumentation.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION FOR HVAC

- A. Manufacturers:
 - 1. Dwyer
 - 2. Trerice.
 - 3. Weiss.
 - 4. Marshaltown.
 - 5. Ashcroft.
 - 6. Enerpac.
 - 7. Peterson.
 - 8. Winters.
 - 9. Substitutions: In accordance with Division 01.

2.2 PRESSURE GAUGES

A. 4-1/2 inch diameter cast aluminum case, phosphor bronze bourbon tube, rotary bronze movement, brass socket, [with silicone fluid dampening] black figures on white background, one percent mid-scale accuracy, scale calibrated in psi. Model 600CB as manufactured by Trerice or approved equal.

2.3 PRESSURE GAUGE TAPS

- A. Gauge Isolation Valve: Lever handle ball valve, forged brass body, chrome plated brass ball, viton o-rings for maximum 150 psig. Model Mini T-82-M as manufactured by Jomar or equal.
- B. Needle Valve: Brass for maximum 150 psig. Model 735 as manufactured by Trerice or equal.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections. Series 870 as manufactured by Trerice.
- D. Coil Siphon: Brass, ¼", male pipe thread each end. 885 series.

2.4 STEM TYPE THERMOMETERS

A. Solar Digital Thermometers shall be adjustable angle type, 7" aluminum with epoxy finished. LCD display digits, switchable between F/C. Thermometer shall require no batteries or external power source and, and have a resolution of 1/10°. Thermometer accuracy shall be 1% of reading or 1°, whichever is greater. Temperature range shall per schedule. SX9 series as manufactured by Trerice or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide two pressure gauges per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge with isolation valve to each tapping.
- C. Install thermometers in piping systems in sockets in short couplings Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Select bulb length to reach centerline of pipe. Coat thermometer stem with conductive compound.
- D. Install thermometer sockets and flanges adjacent to controls system thermostat, transmitter, or sensors. Refer to Section 23 09 23.
- E. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- F. Install gauges, flow meters, and thermometers in locations where they are easily read from normal operating level.
- G. Install solar thermometers in locations where solar cells are activated by fixed interior lighting.

3.2 PRESSURE GAUGE SCHEDULE

LOCATION	SCALE RANGE
Pumps more than 40' TDH	0 - 60 PSIG
Glycol water system	0 - 30 PSIG

3.3 THERMOMETER SCHEDULE

LOCATION	SCALE RANGE
Heating water system	0 - 200° F
Others	As applicable

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Air Systems:
 - 1. Existing HVAC Systems.
- B. Hydronic Systems:
 - Primary-secondary Systems.

1.2 SCOPE

- A. Furnish the professional services of a qualified and approved balancing and testing firm to perform the work of this specification section.
- B. The work of this section includes but is not necessarily limited to:
 - 1. Testing and balancing existing hydronic heating and ventilation systems as indicated on drawings.
 - 2. Working directly with the control subcontractor to obtain proper system adjustments.
- C. The work of this section does not include:
 - 1. Adjusting burners for proper combustion operation.
 - 2. Liquid waste transfer system adjustment.
 - 3. Fire protection systems.

1.3 APPLICABLE CODES AND STANDARDS

- A. SMACNA Manual for the Balancing and Adjustment of Air Distribution Systems.
- B. AMCA Publication 203, Field Performance Measurements.
- C. American Air Balancing Council (AABC) Recommended Procedures
- D. National Environmental Balancing Bureau (NEBB) Recommended Procedures

1.4 QUALIFICATION OF THE BALANCING FIRM OR COMPANY

- A. Subcontractor minimum qualifications include:
 - NEBB Certified in Testing, Adjusting and Balancing of Air and Hydronic Systems or Demonstration of satisfactory completion of five projects of similar scope in the State of Alaska during the past five years. Provide references if requested.

1.5 TIMING OF WORK

- A. Do not begin balancing and testing until the systems, including controls, are completed and in full working order.
- B. Schedule the testing and balancing work in cooperation with other trades.
- C. Complete the testing and balancing at least one week before the date of substantial completion and before any occupancy occurs

1.6 CONTRACTOR RESPONSIBILITY TO BALANCING AGENCY

- A. Award the test and balance contract to an approved firm or company upon receipt of contract to allow the Balance and Testing Agency to schedule this work in cooperation with other trades involved and comply with completion date.
- B. Put all heating, ventilating and controls into full operation for the Balancing Agency and continue the operation of same during each working day of testing balancing.
- C. Provide scaffolding, ladders, and access to each system for proper testing balancing.
- D. Ensure that the building enclosure is complete, including but not limited to, structural components, windows and doors installed, door hardware complete, ceilings complete, stair, elevator, and mechanical shafts complete, roof systems complete, all plenums sealed, etc.
- E. Make any changes in pulleys, belts, and dampers, or add any dampers as required for correct balance as recommended by the Balance and Testing Agency at no additional cost to the Owner.
- F. Complete installation, programming (including design parameters and graphics), calibration, and startup of all building control systems.
- G. Require that the building control system firm provide access to hardware and software, or onsite technical support required to assist the TAB effort. The hardware and software or the onsite technical support shall be provided at no cost to the TAB firm.

1.7 REPORT

- A. Certified Reports shall be included in project O & M manuals. Reports shall include: testing, adjusting, and balancing reports bearing the signature of the Test and Balance Agency Representative. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the system. Follow the procedures and format specified below:
 - Draft Reports: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same

manner specified for the final reports.

- 2. Final Reports: Upon verification and approval of the draft report; prepare final reports, typewritten, organized, and formatted as specified below.
- 3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted and balanced. Report shall be provided in electronic PDF Format. The data in the electronic file shall be arranged and indexed. Divide the contents into the below listed sections, with bookmarks for each section:
 - a. General Information and Summary.
 - b. Air Systems.
 - c. Hydronic Systems.
 - d. Temperature Control Systems.
 - e. Special Systems.
 - f. System Deficiency Reports and Corrective Actions.
- 4. Report Contents: Provide the following minimum information, forms and data:
 - a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency; contractor; owner, architect, engineer and project. Include addresses, contact names and telephone numbers. Also, include a certification sheet containing the name, address, telephone number and signature of the Certified Test and Balance Personnel. Include in this division a listing of the instrumentation used for the procedures along with the proof of calibration.
 - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.
 - c. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.8 SUBMITTALS

- A. Submit in accordance with Division 01.
- B. Submit balancing agency qualifications and sample balancing forms.
- C. Provide list of equipment to be used and date of last calibration.
- D. Submit preliminary balance report a minimum of one week prior to substantial completion

inspection.

PART 2 - PRODUCTS

2.1 INSTRUMENTS

- A. Maintain all instruments accurately calibrated and in good working order. Use instruments with the following minimum performance characteristics.
 - 1. RPM Instruments: Direct reading in revolutions per minute, .5% accuracy; or revolution counter accurate within 2 counts per 1,000.
 - 2. Pressure Readout: Direct reading in feet of water or PSI, .5% accuracy.
 - 3. Temperature Instruments Direct reading in degrees F, +.5% accuracy.
 - 4. Water Flow Instruments: Differential pressure type; direct reading in feet of water or PSI, accuracy, suitable for readout balancing valve provided.

PART 3 - EXECUTION

3.1 GENERAL PROCEDURES FOR ALL SYSTEMS

- Start with new, clean filters.
- B. In cooperation with the control manufacturer's representative, coordinate adjustments of automatically operated dampers and valves to operate as specified, indicated and/or noted.
- C. Use manufacturer's ratings on all equipment to make required calculations.
- D. Make final adjustments for each space per heating or cooling comfort requirement. State reason for variance from design CFM, i.e., "too noisy", "drafty", etc.
- E. Mark equipment and balancing device settings (including damper-control positions, valve position indicators, fan-speed-controls, and similar controls and devices) with paint or other suitable permanent identification material to show final settings.

3.2 FLUID SYSTEM TESTING AND BALANCING

- A. Preparation of system Phase I:
 - 1. Clean all strainers.
 - 2. Examine fluid in system to determine if treated and clean.
 - 3. Check pump rotation.
 - 4. Verify expansion tanks are not air bound and system full of fluid.
 - 5. Verify all air vents at high points of fluid systems are installed properly and are operating

- freely. Make certain all air is removed from circuiting system.
- 6. Open all valves to full flow position including coil and heater stop valves, close bypass valves and open return line balancing cocks. Set temperature controls so that automatic valves are open to full flow through apparatus.
- 7. Check and set operating temperature of boilers and heat exchangers to design requirements when balancing by temperature drop.
- 8. Adjust all flows to 110% of design flows as shown.

B. Test and Balance Procedure - Phase II:

- 1. Set pumps to proper GPM delivery and set proper GPM delivery in main piping runs from boiler room. Note flow variations for additive alternates.
- 2. Adjust flow of fluid through primary equipment.
- 3. Check leaving fluid temperatures and return fluid temperatures and pressure drop through major equipment. Reset to correct design temperatures.
- 4. Check fluid temperature at inlet side of coils and other heat transfer equipment. Note rise or drop of temperatures from source.
- 5. Balance each coil and all other heat transfer apparatus in system.
- 6. Upon completion of flow readings and adjustments, mark all settings and record all data.

C. Test and Balance Procedure - Phase III:

- 1. After making adjustments to coils and apparatus, recheck settings at pumps and major equipment. Readjust if required.
- Attach pressure gauges on each coil, then read pressure drop through coil at set flow rate on call for full flow through coil. Set pressure drop across bypass valve to match coil full flow pressure drop. This prevents unbalanced flow conditions when coils are on full bypass.
- 3. Check and record the following items with flows set at 100% of design.
 - a. Inlet and leaving fluid and air temperatures at coils and major equipment.
 - b. GPM flow of each coil and major equipment.
 - c. Pressure drop of each coil and major equipment.
 - d. Pressure drop across bypass valve.
 - e. Pump operating suction and discharge pressures and final total developed head.

Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

- f. Pump GPM.
- g. Rated and actual running amperage and voltage of pump motor.
- h. Full nameplate data of all pumps and equipment.
- i. Electrical overloads/heaters sizes and ranges of motors.
- 4. Permanently mark adjusted position of all balancing valves. Stamp indicator plate of circuit setters and other balancing valves without memory stop.

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Piping Insulation.
- B. Equipment Insulation.
- C. Jackets and Accessories.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC Systems.
- B. Section 23 05 19 Meters and Gages for HVAC Piping.
- C. Section 23 21 13 Hydronic Piping.
- D. Section 23 21 16 Hydronic Specialties.

1.3 REFERENCES

- A. ASTM B209 Aluminum and Aluminum-alloy Sheet and Plate.
- B. ASTM C195 Mineral Fiber Thermal Insulating Cement.
- C. ASTM C450 Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
- D. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- E. ANSI/ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation.
- F. ANSI/ASTM C534 Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- G. ANSI/ASTM C552 Cellular Glass Thermal Insulation.
- H. ANSI/ASTM C578 Preformed, Block Type Cellular Polystyrene Thermal Insulation.
- I. ASTM C585 Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
- J. ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
- K. ASTM C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- L. ASTM D774 Standard Test Method for Bursting Strength of Paper.
- M. ASTM D1000 Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
- N. ASTM E84 Surface Burning Characteristics of Building Materials.
- O. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- P. UL 723 Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Include product description, thickness for each service, and locations.
- C. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.
- C. Materials: Flame spread/smoke developed rating of 25/50 in accordance with UL 723, ASTM E84, or NFPA 255.
- D. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Shipment of materials from manufacturer to installation location shall be in weather tight transportation.
- D. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.7 ENVIRONMENTAL REQUIREMENTS

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

1.8 FIELD MEASURMENTS

A. Verify field measurements prior to fabrication.

1.9 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Armacell.
- B. Certain-Teed.
- C. IMCOA.
- D. Johns Manville.
- E. Knauf.
- F. Owens-Corning.
- G. Manson.
- H. Nomaco.
- I. Pittsburgh Corning.
- J. K-Flex USA.
- K. Armstrong.
- L. Substitutions: Under provisions of Division 01.

2.2 INSULATION - PIPING

A. Type A: Glass fiber, rigid, molded, non-combustible insulation; ANSI/ASTM C547; 'k' value of 0.23 at 75° F, rated from 0° F to 850° F, vapor retarder jacket of Kraft paper bonded to aluminum foil, self-sealing lap and butt strips; Johns Manville "Micro-Lok" or approved equal.

2.3 FIELD APPLIED PIPING JACKET

- A. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
- B. PVC Jackets and solvent welding adhesive: One piece, pre-molded type, Johns Manville "Zeston 2000", fitting covers and jacketing material. Johns Manville "Perma-Weld" solvent welding adhesive.
- C. Re-Wettable Canvas Jacketing: , Fiberglass cloth made from texturized yarns, impregnated throughout with an inorganic fire retardant asbestos free adhesive; 20x14 thread count, 14.5 oz./sq.yd, 0.04 inch thickness, 1,000° F upper temperature limit; GLT Products "Style 1989" or approved equal.

2.4 INSULATION - EQUIPMENT

A. Type I: Reusable Valve Wrap Insulation Covers: Removable and reusable wraps packaged with a 1" thick fiberglass blanket insert to completely cover the insulated equipment. The outer cover of the shall be made of DuPont Tychem® QC that is secured with a Velcro closure. Tychem® QC consists of a durable Tyvek® substrate quality coated with polyethylene that is impermeable to water. K= .28 @ 100° F; Temperature Limits 0°F to 450°F; Water Vapor Transmission ASTM E 96 0.01 Perms at 37.8C/100F-RH/100%; Breaking Strength Grab (md/cd) ASTM D5034-90 43/49 lbs; Tearing Strength Trapezoid (md/cd) ASTM D1117-80 7/5 lbs; Weatherable Grade; UV resistant; White/gloss finish; UL25/50 rating and are non-

2.5 INSULATION - DUCTWORK

A. Type L: Exterior FSK Rigid Fiber Board Duct Insulation; ASTM C612, 'k' value of 0.23 at 75° F, 3.0 lb./cu. ft. density. 0.00035 inch foil scrim facing. Johns Manville "814 Spin-Glas" or equal.

2.6 INSULATION ACCESSORIES

- A. Adhesives: Waterproof and fire-retardant type.
- B. Lagging Adhesive: Fire resistive to NFPA 255.
- C. Impale Anchors: Galvanized steel, 12 gauge, self-adhesive pad.
- D. Joint Tape: Glass fiber cloth, open mesh.
- E. FSK Joint Tape; ASTM C1136 Foil-Scrim-Kraft (FSK) lamination coated with solvent acrylic pressure sensitive adhesive; capable of adhering to fibrous and sheet metal surfaces; tri-directionally reinforced 2x3 squares per inch fiberglass scrim; 9.5 mils thick, -40 to 240° F service temperatures; Venture Tape "1525CW" or approved equal.
- F. Tie Wire: Annealed steel, 16 gauge.
- G. Insulated pipe supports: Calcium silicate with galvanized steel jacket (min. 24 gauge); ANSI/ASTM C533; rigid white; 'k' value of 0.37 at 100° F, rated to 1,200° F; Thermal Pipe Shields "T-1000 Calsil" or equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install materials after piping and equipment has been tested and approved.
- B. Clean surfaces for adhesives.
- C. Prepare surfaces in accordance with manufacturer's recommendations.

3.2 INSTALLATION – PIPING INSULATION

- A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.
- B. Continue insulation vapor barrier through penetrations except where prohibited by code.
- C. Locate insulation and cover seams in least visible locations.
- D. Neatly finish insulation at supports, protrusions, and interruptions.
- E. For insulated pipes conveying fluids above ambient temperature, secure jackets with self-sealing lap or outward clinched, expanded staples. Bevel and seal ends of insulation at equipment, flanges, and unions. Insulate complete system, including under fitting jackets.
- F. Provide insert fabricated of Johns Manville Thermo-12 Gold or other heavy density insulating material suitable for temperature between support shield and piping on piping 1-½" inch diameter or larger. Insulation inserts shall not be less than the following lengths:

1-1/2" to 2-1/2" pipe size

10" long

3" to 6" pipe size

12" long

- G. For exterior applications, provide weather protection jacket or coating. Insulated pipe, fittings, joints, and valves shall be covered with PVC or metal jacket. Jacket seams shall be located on bottom side of horizontal piping.
- H. Fully insulate all piping including all spaces under jacketing.
- Jackets
 - 1. Indoor, Concealed Applications: Insulated pipes shall have vapor barrier jackets, factory-applied. Vapor barrier PVC fittings may also be used provided joints are sealed with solvent welding adhesive approved by the jacket manufacturer.
 - 2. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with PVC jacket and fitting covers or metal jacket.

3.3 SCHEDULE - PIPING

PIPING	TYPE	PIPE SIZE	MINIMUM INSULATION THICKNESS
Heating Glycol/Water Supply and Return	А	1-1/4" and Smaller	1"
Heating Glycol/Water Supply and Return	А	1-1/2" and Larger	1"

3.4 INSTALLATION - EQUIPMENT

- A. Install materials in accordance with manufacturer's instructions.
- B. Do not insulate factory insulated equipment.
- C. Apply insulation as close as possible to equipment by grooving, scoring, and beveling insulation, if necessary. Secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands. Minimum 2" overlap on blanket material.
- D. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- E. Cover insulation with metal mesh and finish with heavy coat of insulating cement.

- F. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
- G. When equipment with insulation requires periodical opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.
- H. Where canvas jacketing is indicated, apply mastic in sufficient thickness to completely cover the texture of the canvas material.

3.5 SCHEDULE - EQUIPMENT

EQUIPMENT	INSULATION	THICKNESS
	TYPE	
Valves	1	1"

3.6 INSTALLATION – DUCTWORK INSULATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature. Continue insulation with vapor barrier through penetration.
- C. Fiberglass Duct Liner (Type L) Application:
 - Adhere insulation with approved adhesive for 100 percent coverage. Secure insulation
 with mechanical fasteners on 15 inch centers maximum on top and side of ductwork with
 dimension exceeding 20 inches. Butt joints together tightly then seal and smooth.
 Thoroughly coat ends of liner with adhesive. Do not use nail-type fasteners. Seal vapor
 barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 2. Ductwork dimensions indicated are net inside dimensions required for air flow. Increase ductwork to allow for insulation thickness.
 - 3. Install liner as indicated on plans.
- D. Where ductwork is scheduled for exterior insulation and is shown on the plans to be internally lined, the exterior insulation thickness may be reduced by the thickness of the lining. Where exterior insulation can be eliminated or reduced due to thickness of lining, overlap exterior insulation a minimum 24 inches over lined ductwork.
- E. Where canvas jacketing is indicated, apply mastic in sufficient thickness to completely cover the texture of the canvas material.

3.7 SCHEDULE - DUCTWORK

DUCTWORK	TYPE	INSULATION THICKNESS	FINISH
Combustion Air Duct	L	2" Rigid	CANVAS

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Control Valves.
- B. Thermostats.
- C. Pressure Gauges.
- D. Pressure Gauge Taps.
- E. Thermometers.
- F. Thermometer Wells.
- G. Standalone Controllers.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 23 21 13 - Hydronic Piping

1.3 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 Test Methods for Louvers, Dampers, and Shutters.
- B. American Society of Mechanical Engineers:
 - 1. ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. ASTM International:
 - 1. ASTM B32 Standard Specification for Solder Metal.
 - 2. ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
 - 3. ASTM D1693 Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
- D. National Electrical Manufacturers Association:
 - 1. NEMA DC 3 Residential Controls Electrical Wall Mounted Room Thermostats.
- E. National Fire Protection Association:
 - 1. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Division 01.
- B. Submit product data under provisions of Division 01.
- C. Product Data: Include list which indicates use, operating range, total range and location for manufactured components.
- D. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Division 01.
- B. Accurately record actual locations of instrumentation.

1.6 ENVIRONMENTAL REQUIREMENTS

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

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - INSTUMENTATION

- A. Trerice.
- B. Weiss.
- C. Dwyer.
- D. Substitutions: Under provisions of Section Division 01.

2.2 PRESSURE GAUGES

A. 4-1/2inch diameter cast aluminum case, phosphor bronze bourbon tube, rotary bronze movement, brass socket, with silicone fluid dampening black figures on white background, one percent midscale accuracy, scale calibrated in psi. Model 600C as manufactured by Trerice.

2.3 PRESSURE GAUGE TAPS

A. Gauge Isolation Valve: Lever handle ball valve, forged brass body, chrome plated brass ball, viton o-rings for maximum 150 psig. Model Mini T-82-M as manufactured by Jomar.

2.4 SOLAR POWERED DIGITAL THERMOMETER

A. Hi-impact ABS case; -50/ 300°F (-45/150° C) swtichable range; 1/2" LCD digits, wide ambient formula display; 1% accuracy; 1/10° between -19.9/199.9 °F (-28/93°C) resolution; 10 Lux (one foot-candle) LUX rating; 10 second update rate; -30/140°F (-35/60°C) ambient operating range; Glass passivated thermistor – NTC sensor. Model Digital Vari-angle as manufactured by Weiss Products.

2.5 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.6 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel or Viton core for temperatures up to 350 degrees F.

2.7 ACCEPTABLE MANUFACTURERS – THERMOSTATS AND CONTROL VALVES

- A. Honeywell.
- B. Siemens.
- C. Johnson.
- D. Belimo.
- E. Substitutions: Under provisions of Section Division 01.

2.8 LOW VOLTAGE THERMOSTATS

A. Digital 24 vac voltage thermostat: 7 day programming, digital display, menu-drive, precise temperature control (+/-1 degree F), battery backup, 40 F to 85 F set point range, hardwired power.

2.9 LINE VOLTAGE THERMOSTATS

A. Line voltage thermostat compatible with unit heaters and cabinet unit heaters.

2.10 CONTROL VALVES

A. Forged brass body, stainless steel base plate and bearing plate, chrome plated brass stem, paddle and stem seal assembly compatible with heating system fluid, fully rated for 300 PSIG, 200 deg F fluid temperature, 30 psi close off. Powerhead replaceable without removal of valve body from system. Powerhead secured to valve body with machine screws and sealed with O ring.

2.11 ACCEPTABLE MANUFACTURERS – STANDALONE CONTROLLERS

- A. Honeywell.
- B. Johnson.
- C. Tekmar.

2.12 STANDALONE CONTROLLERS

A. 24VAC, 60HZ, digital inputs and outputs, relay contact output, 0-10V modulating output, input temperature sensing, key pad and digital screen. Honeywell T775 or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide proper grounding of all control wiring.
- C. Provide two pressure gauges per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge with isolation valve to each tapping.
- D. Install thermometers in piping systems in sockets in short couplings Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Select bulb length to reach centerline of pipe.
- E. Install thermometers in air duct systems on flanges.
- F. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gauges and thermometers in locations where they are easily read from normal operating level.

3.2 IDENTIFICATION

- A. All controllers, transmitters, switches, thermostats, gauges, and devices with adjustable setpoints shall be permanently tagged for identification.
- B. The tagging scheme shall be reflected on the control drawings. Also, include plain language label.

3.3 POWER AND INTERFACE CONNECTIONS

- A. Coordinate fully with other Divisions of this specification to provide all necessary power connections and interface connections for a complete and fully operable control system.
- B. Electric wiring and wiring connection required for the installation of the control system as herein specified shall be provided by the Controls Contractor.
- C. Line voltage wiring shall be installed in raceways.
- D. Low voltage wiring shall be physically protected and installed in raceways.
- E. All wiring shall comply with the requirements of local and national electrical codes and with Division 26.
- F. All wiring and conduit shall be installed by qualified personnel with electrical certificate of fitness.

3.4 INSTRUCTION AND ADJUSTMENT

- A. Upon completion of the project, the controls contractor shall adjust and validate all thermostats, controllers, damper operators, relays, etc. provided under this section, or where sequence is listed, he shall validate and calibrate controls provided by others.
- B. Instruction manuals shall be provided by the controls contractor and approved by the Engineer. Such manuals shall cover the function and operation of the control system on the project for use

by the Owner's operating personnel. Such manuals shall be used in conjunction with two (2) hours of on-site instruction to familiarize operating personnel with the control system. The required instruction shall consist of a "classroom" period and a "field" period.

- 1. The classroom portion shall cover:
 - a. Preventive maintenance procedures.
 - b. A brief description of the controls' sequence of operation.
 - c. A discussion and explanation of all alarms, switches, and gauges.
 - A summary and brief explanation of steps to be taken for specific alarm or control malfunctions.
- 2. The field portion shall consist of a building walk- through to physically locate and examine all control devices, and demonstrations on control setpoint adjustment procedures. Adjusting procedures should emphasize methods for continual building "fine-tuning." Also, demonstrate all controls sequences to the Owner and Engineer on final acceptance.
- C. The controls contractor shall provide a complete controls maintenance section for inclusion in the mechanical maintenance manuals. This shall include as-built control diagrams, Sequence of Operation, control parts list, equipment data sheets, preventive maintenance requirements and schedules, and the above-mentioned instruction manual.
- D. At the instruction period, a one (1) year "In Warranty" maintenance agreement shall be presented to Owner's Representative.

3.5 WARRANTY

A. Upon completion of the project, as defined either by acceptance of the building by the Owner or use of the equipment by the Owner for its intended purposes - whichever occurs first, a warranty period of one (1) year shall commence. The warranty shall consist of a commitment by the controls contractor to provide, at no cost to the Owner, parts and labor as required to repair or replace such parts of the control system that prove inoperative due to defective materials or installation practices. This warranty expressly excludes routine service, such as instrument calibration.

3.6 PRESSURE GAUGE SCHEDULE

LOCATION	SCALE RANGE
Pumps more than 40' TDH	0 - 60 PSIG
Heating Water System	0 - 30 PSIG

3.7 DIGITAL THERMOMETER SCHEDULE

LOCATION	SCALE RANGE
Heating /Water System	0 - 200° F

SECTION 23 11 23 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC
- B. Section 23 05 19 Meters and Gages for HVAC Piping.

1.3 QUALITY ASSURANCE

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

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Include data on pipe materials, pipe fittings, valves, and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 NATURAL GAS PIPING, ABOVE GRADE

- A. Piping: Steel Pipe ASTM A53, Schedule 40 black. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.
- B. Joints:
 - 1. Low pressure, 2" and under: Screwed or Viega MegaPressG Cold Press Mechanical Joint. Press fittings are acceptable to last tee for connection to the appliance. Utilize threaded piping at the last tee.
 - 2. Medium pressure or larger than 2": ANSI/AWS D1.1, welded.

C. Finish:

- 1. Exterior Piping: Epoxy coating. Color to be Grey.
- 2. Interior Piping: None.

2.2 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping: 1/16 inch thick preformed neoprene bonded to fiber.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 ACCEPTABLE MANUFACTURERS – GAS COCKS AND BALL VALVES

- A. Apollo.
- B. Hammond.
- C. Milwaukee.
- D. Nibco.
- E. Substitutions: Under provisions of Division 01

2.4 GAS COCKS

- A. Up to 2 Inches: Bronze body, bronze tapered plug. non-lubricated, Teflon packing, threaded ends.
- B. Over 2 Inches: Cast iron body and plug, non-lubricated, Teflon packing, flanged ends.

2.5 BALL VALVES

- A. Up to 2 Inches: Bronze two piece body, full port, forged brass, chrome plated ball, Teflon seats and stuffing box ring, lever handle, solder, threaded or press-fit ends.
- B. Over 2 Inches: Cast steel, two piece body, full port chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged, solder, threaded or press-fit ends.

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. Verify that excavations are to required grade, dry, and not over excavated.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- 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 to conserve building space and not interfere with use of space.
- 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 for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Provide properly sized handles for valve operation. Handles shall not be cut or bent to make fit where installed.

3.3 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.4 TESTING

A. Test all piping in accordance with IFGC and UPC requirements. The test pressure used shall be no less than 10 times the proposed maximum working pressure, but not less than 10 psig for low pressure gas systems (7 inch WC) or 60 psig for medium pressures gas systems (2 psig or 5 psig). All welded pipe shall be tested with not less than 60 psig test pressures.

SECTION 23 21 13 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Pipe and Pipe Fittings.
- B. Valves.
- C. Water Piping System.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. Section 23 05 19 Meters and Gages for HVAC Piping.
- C. Section 23 07 00 HVAC Insulation.
- D. Section 23 21 16 Hydronic Piping Specialties.
- E. Section 23 21 23 Hydronic Pumps.
- F. Section 23 52 16 Condensing Boilers.

1.3 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME B31.9.

1.4 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9, and applicable state labor regulations.
- C. Welders Certification: In accordance with ANSI/ASME SEC 9.

1.5 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Include data on pipe materials, pipe fittings, valves, and accessories.
- C. Include welders certification of compliance with ANSI/ ASME SEC 9.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53, Schedule 40, for sizes 4 inch and over, black.
 - 1. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, steel welding type fittings.
 - 2. Joints: Screwed, or ANSI/AWS D1.1, welded.
- B. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ANSI/ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings or ANSI/ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 2. Joints: ASTM B32, solder, Grade 95TA or ANSI/AWS A5.8, BCuP silver braze; Flux: ASTM B813.
 - 3. Press Fittings: Viega ProPress Fittings are allowed. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press end shall have Smart Connect feature design leakage path. Smart Connect™ (SC Feature) In ProPress ½" to 4" dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an un-pressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.
- C. Grooved piping systems are not allowed.

2.2 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ANSI/ASME B16.18 cast bronze, or ANSI/ASME B16.29 solder wrought copper.
 - Joints: ASTM B32, solder, Grade 95TA or ANSI/AWS A5.8, BCuP silver braze; Flux: ASTM B813.
- B. PVC Pipe: ASTM D1785, Schedule 40, and Schedule 80 for sizes 8 inch and larger, or ASTM D2241, SDR 21 or 26.
 - 1. Fittings: ASTM D2466 or D2467, PVC.
 - 2. Joints: ASTM D2855, solvent weld.

2.3 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping.
- C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; C-shape elastomer

composition sealing gasket for operating temperature range from -30° F to 230° F; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.

2.4 GATE VALVES

A. Gate valves will not be permitted. Use ball or butterfly valves for isolation.

2.5 GLOBE VALVES

A. Globe valves will not be permitted. Use ball or butterfly valves for throttling.

2.6 ACCEPTABLE MANUFACTURERS - ALL VALVE TYPES

- A. Apollo.
- B. Crane.
- C. FNW.
- D. Hammond.
- E. Milwaukee.
- F. NIBCO.
- G. Red-White Valve Corp.
- H. Substitutions: Under provisions of Division 01.

2.7 BALL VALVES

- A. Up to 2 Inches: 600 PSI CWP Bronze two piece body, full port, forged brass, chrome plated ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends with union
- B. Over 2 Inches: Cast steel, two piece body, full port chrome plated steel ball, Teflon seat and stuffing box seals, lever handle [or gear drive handwheel for sizes 10 inches and over], flanged. Seat material to be compatible with liquid handled.

2.8 PLUG COCKS

- A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, with one wrench operator for every ten plug cocks.
- B. Over 2 Inches: 285 CWP Cast iron body and plug, pressure lubricated, Teflon packing, flanged ends, with wrench operator with set screw.

2.9 BUTTERFLY VALVES

A. Over 2 Inches: 200 PSI CWP Ductile iron body, aluminum bronze disc, EPDM seat for service to 250° F, lug ends, extended neck, 10 position lever handle.

2.10 SWING CHECK VALVES

A. Up to 2 Inches: Bronze 45° swing disc, solder ends.

B. Over 2 Inches: Iron body, bronze trim, 45° swing disc, renewable disc and seat, flanged ends.

2.11 SPRING LOADED CHECK VALVES

A. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

2.12 RELIEF VALVES

A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.13 HYDRONIC SYSTEM CLEANER

- A. Acceptable Products:
 - 1. CH2O Boil Out Liquid
 - 2. Oatey Hercules Boiler and Heating System Cleaner.

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. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- B. Install piping to conserve building space, and not interfere with use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.
- E. Provide clearance for installation of insulation, and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Division 09.
- J. Install valves with stems upright or horizontal, not inverted.

- K. Provide properly sized handles for valve operation. Handles shall not be cut or bent to make fit where installed.
- L. Support all piping in accordance with International Mechanical Code and Manufacturer installation instructions. Where there is a conflict between requirements of the Mechanical Code and Manufacturer installation instructions, the more restrictive requirement shall apply.

3.3 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball or butterfly valves for throttling, bypass, or manual flow control services.
- F. Provide spring loaded check valves on discharge of condenser water pumps.
- G. Provide ¾ inch ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. [Pipe to nearest drain.]

3.4 CLEANING OF THE HYDRONIC SYSTEM

- A. Prior to starting work, verify system is complete. Thoroughly flush and drain the system. Clean all strainer baskets and start-up screens on pump suction diffusers. Re-install strainer baskets and start-up screens and refill system.
- B. Fill the hydronic piping systems with the system cleaner in accordance with cleaning compound directions for use.
- C. Boil out system for a minimum period of four (4) hours or as recommended by system cleaner at a system design operating temperature.
- D. Upon completion of boil out, completely flush system and drain all low points. Remove and clean and re-install all strainer baskets. Remove start-up screens on pump suction diffusers.
- E. Fill system with water as indicated on the plans. Feed water to system through make-up line with pressure regulator, venting system high points. Set to fill at 12 psig. Pressure system cold at 5 psig, adjust when hot to 12 psig.
- F. Submit a written and signed statement to the Owner that the above referenced cleaning procedures have been completed.

3.5 TESTING

A. Test all heating water piping hydrostatically at 100 psig or 150 percent of working pressure, whichever is greater, for a period of 4 hours. Observe piping during this period and repair all leaks.

SECTION 23 21 16 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Expansion Tanks.
- B. Air Vents.
- C. Hydraulic Separators.
- D. Strainers.
- E. Balance Valves.
- F. Relief Valves.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. Section 23 21 23 Hydronic Pumps.
- C. Section 23 52 16 Condensing Boilers.

1.3 REFERENCES

A. ANSI/ASME - Boilers and Pressure Vessels Code.

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME Boilers and Pressure Vessels Code Section 8D for manufacture of tanks.

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.6 SUBMITTALS

- A. Submit product data under provisions of Division 01 and Section 23 05 00.
- B. Submit glycol solution test results with glycol percentage and PH after system fill procedures are completed.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.
- B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.

1.9 EXTRA STOCK

A. Provide one extra 10 gallon drum of propylene glycol.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Amtrol.
- B. Taco.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of Division 01.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Construction: Welded steel, tested and stamped in accordance with Section 8D of ANSI/ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- B. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

2.3 ACCEPTABLE MANUFACTURERS - AIR VENTS

- A. Taco.
- B. Amtrol.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of Division 01.

2.4 AIR VENTS

A. High Capacity Automatic Air Vent: Cast iron body, stainless steel and brass trim, EPDM diaphragm, rated for 250°F, 2 PSIG through 150 PSIG, ¾ inch system connection, 3/8 inch NPT connection to atmosphere with drain piping. Provide with isolation valve and strainer upstream of vent. Armstrong AAE-750 or equal.

2.5 ACCEPTABLE MANUFACTURERS - HYDRAULIC SEPARATORS

- A. Caleffi.
- B. Substitutions: Under provisions of Division 01.

2.6 HYDRAULIC SEPARATORS

- A. Coalescing type combination air eliminator and dirt separator fabricated of steel, rated for 150 psig working pressure, stamped, and registered in accordance with ASME Section VIII, Division 01 for unfired pressure vessels, and include two equal chambers above and below the inlet / outlet nozzles. Unit shall include internal elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. Dirt separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. The elements must consist of a copper core tube with continuous wound copper wire medium permanently attached and followed by a separate continuous wound copper wire permanently affixed. Each unit shall have a separate venting chamber to prevent system contaminants from harming the float and venting valve operation. At the top of the venting chamber shall be an integral full port float actuated brass venting mechanism. Units shall include a valved side tap to flush floating dirt or liquids and for quick bleeding of large amounts of air during system fill or refill. Include removable lower head for internal inspection.
- B. Air Elimination Valve: Bronze, float operated, for 125 psig operating pressure.

2.7 ACCEPTABLE MANUFACTURERS - STRAINERS

- A. Bell & Gossett.
- B. Taco.
- C. Armstrong.
- D. Substitutions: Under provisions of Division 01.

2.8 STRAINERS

- A. Size 2 inch and Under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- B. Size 2-½ inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.9 ACCEPTABLE MANUFACTURERS - BALANCE VALVES

- A. Armstrong.
- B. Taco.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of Division 01.

2.10 BALANCE VALVES

A. Angle or straight pattern, inside screw globe 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 lockshield key cap [and set screw memory bonnet] for balancing service.

2.11 ACCEPTABLE MANUFACTURERS - RELIEF VALVES

A. Watts.

- B. Taco.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of Division 01.

2.12 RELIEF VALVES

A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 - EXECUTION

3.1 INSTALLATION AND APPLICATION

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. For automatic air vents, provide vent tubing to nearest drain in mechanical room.
- D. Provide valved drain and hose connection on strainer blow down connection.
- E. Provide shutoff valves on water inlet to terminal heating units such as radiation, unit heaters, and fan coil unit.
- F. Provide balancing valves on water outlet from terminal heating units.
- G. Provide relief valves on pressure tanks, low pressure side of reducing valves, and heat exchangers.
- H. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- I. Pipe relief valve outlet to floor drain.
- J. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

3.2 AIR VENT APPLICATION SCHEDULE

Location	Туре
Heating mains, at high points in system	Automatic
Combination air separator/strainers	High capacity

Note: For terminal heating units, mains above unit, install branch piping connections at bottom of mains or 45° from bottom to allow air migration to mains.

SECTION 23 21 23 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. In-line Circulators.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. Section 23 05 19 Meters and Gages for HVAC Piping.
- C. Section 23 21 13 Hydronic Piping.
- D. Section 23 21 16 Hydronic Piping Specialties.

1.3 REFERENCES

A. ANSI/UL 778 - Motor Operated Water Pumps.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with minimum three years' experience.
- B. Alignment: Base mounted pumps shall be aligned by qualified millwright and alignment certified.

1.5 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Submit manufacturer pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.
- B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.

1.8 EXTRA PARTS

A. Provide one extra set of mechanical seals for pumps.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Grundfos.
- B. Taco.
- C. Substitutions: Under provisions of Division 01.

2.2 GENERAL CONSTRUCTION REQUIREMENTS

- A. Balance: Rotating parts, statically and dynamically.
- B. Construction: To permit servicing without breaking piping or motor connections.
- C. Pump Motors: Operate at 1750 rpm unless specified otherwise.
- D. Pump Connections: Flanged.

2.3 VFD CONTROLLED IN-LINE CIRCULATORS

- A. Type: Maintenance free, self-lubricated, pump mounted VFD controlled industrial/commercial single stage, direct drive circulator.
- B. Differential pressure monitoring.
- C. Casing: Cast iron.
- D. Impeller: Type 304 stainless steel.
- E. Bearings: Upper and lower radial bearings to be aluminum oxide ceramic, tungsten carbide shaft bearing surfaces.
- F. Shaft: Stainless steel with type 430F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- D. Decrease from line size with long radius reducing elbows or reducers.
- E. Support piping adjacent to pump such that no weight is carried on pump casings. In-line pumps are supported by adjacent piping.
- F. Provide line sized shut-off valve and strainer on pump suction, and line sized combination pump discharge valve on pump discharge.

- G. Provide air cock and drain connection on horizontal pump casings.
- H. Lubricate pumps before start-up.

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - Duct Materials.
 - 2. Duct Fabrication.

1.2 RELATED SECTIONS

A. Section 23 07 00 - HVAC Insulation

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM A36/A36M Standard Specification for Carbon Structural Steel.
 - 2. ASTM A90/A90M Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - 3. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 4. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 5. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 6. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 7. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA HVAC Duct Construction Standard Metal and Flexible.
- C. Underwriters Laboratories Inc.:
 - 1. UL 181 Factory-Made Air Ducts and Connectors.

1.4 PERFORMANCE REQUIREMENTS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.

- B. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.
- C. Outside Air Ductwork: Ductwork shall be sheet metal ductwork designed for static pressure class of -2" wg.

1.5 SUBMITTALS

- A. See General Conditions and the General Requirements in Division 01 regarding submittals.
- B. Product Data: Submit data for duct materials, and duct sealant.

1.6 CLOSEOUT SUBMITTALS

- A. Division 01 Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

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

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 experience.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 Product Requirements.
- B. Maintain manufacturers requirements for duct sealant temperatures during and after installation of duct sealant.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90/A90M.

- B. Fasteners: Rivets, bolts, or sheet metal screws.
- C. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic. Maximum VOC content of 75 g/L.
- D. Hanger Rod: ASTM A36/A36M; steel; threaded both ends, threaded one end, or continuously threaded.

2.2 DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- C. 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, furnish turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence wherever possible. Maximum 30° divergence upstream of equipment and 45°convergence downstream.
- E. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.
- F. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
- G. Use double nuts and lock washers on threaded rod supports.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

- A. Install ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- B. Seal ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible. Refer to SMACNA standard duct sealing requirements per pressure construction class.
- C. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Install duct hangers and supports in accordance with Section 23 05 00.

E. Use double nuts and lock washers on threaded rod supports.

3.3 SCHEDULES

A. Ductwork Material Schedule:

Air System	Material
Combustion Air	Galvanized Steel

SECTION 23 51 00 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Manufactured Chimneys for Gas Fired Equipment.
- B. Venting for Condensing Appliances.

1.2 RELATED SECTIONS

- A. Section 23 05 00 Common Work Results for HVAC
- B. Section 23 52 16 Condensing Boilers.
- C. Section 26 05 83 Wiring Systems.

1.3 REFERENCES

- A. ANSI/ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ANSI/ASTM A525 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- C. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A924/A924M Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- E. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- F. ASTM C401 Standard Classification of Alumina and Alumina-Silicate Castable Refractories.
- G. ANSI Z21.66 Electrically Operated Automatic Vent Damper Devices for Use with Gas-Fired Appliances.
- H. ANSI Z21.67 Mechanically Actuated Automatic Vent Damper Devices for Use with Gas-Fired Appliances.
- I. ANSI Z21.68 Thermally Operated Automatic Vent Damper Devices for Use with Gas-Fired Appliances.
- J. ANSI Z95.1 (NFPA 31) Standard for the Installation of Oil Burning Equipment.
- K. ANSI Z223.1 (NFPA 54) The National Fuel Gas Code.
- L. ASHRAE Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems."
- M. NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.

- N. SMACNA HVAC Duct Construction Standards Metal and Flexible.
- O. UL 103 Standard for Factory Built Low Heat Chimneys.
- P. UL 127 Standard for Factory Built Fireplaces.
- Q. UL 378 Standard for Draft Equipment.
- R. UL 441 Standard for Gas Vents.
- S. UL 641 Standard for Low Temperature Venting Systems.
- T. UL 959 Medium Heat Appliance Factory Built Chimneys.

1.4 **DEFINITIONS**

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

1.5 DESIGN REQUIREMENTS

A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.6 QUALIFICATIONS

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

1.7 REGULATORY REQUIREMENTS

- A. Conform to NFPA 54 for installation of [natural gas] [propane] burning appliances and equipment.
- B. Conform to NFPA 31 for installation of oil burning appliances and equipment.

1.8 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breeching. Submit layout drawings indicating plan view and elevations.
- C. Product Data: Submit data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights and connection requirements.

- D. Engineering Data: Submit stack sizing calculations confirming proper stack sizing for the specific equipment used on this project.
- E. Manufacturer's Installation Instructions: Submit assembly, support details, and connection requirements.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication, adjust layout as required to avoid conflict with structure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Metalbestos.
- B. Selkirk.
- C. Schebler.
- D. Hart & Cooley.
- E. Van Packer.
- F. Substitutions: Under provisions of Division 01.

2.2 HIGH EFFICIENCY CONDENSING BOILER VENTING

- A. Provide all accessories for a complete system each bearing factory applied UL label, including but not limited to supports, roof penetrations, appliance connectors, drain fittings and terminations.
- B. The factory built modular vent shall be laboratory tested and listed in accordance with Underwriters Laboratories Standard UL 1738 for use with category II, III, & IV appliances with a maximum flue gas temperature of 550°F and ULC-S636-95 for gas vent BH, Class I / Class II 245°C.
- C. Vent sections shall be sealed with $\frac{1}{2}$ " banded flanges and silicone joint sealant for temperatures up to 600°F with a UL tested pressure rating of 40" w.c.
- D. Inner shell material shall be type AL 29-4C® stainless steel. Inner shell thickness shall be 20 gauge. All inner shell seams shall be full penetration welded. Riveted, tack or spot welded seams are not permitted.
- E. Outer shell material shall be aluminized steel with a thickness of .034", outer shell material can be 304 or 316 stainless steel. All outer shell seams shall be full penetration welded the entire length of the pipe section. Riveted, tack or spot welded seams are not permitted.
- F. There shall be a minimum 1" of 1600°F rated low conductivity ceramic fiber insulation between the inner and outer shells. The insulation is to be securely attached to the inner shell with steel straps and insulating pins welded to the inner shell. Stainless steel centering clips shall be welded to the outer shell to maintain the 1" spacing and ensure concentricity of the shells.

- G. Breeching and vent sections, when installed according to manufacturer's instructions, shall comply with national safety standards and building codes. Stacks terminating above a roof must terminate as required by code or NFPA 211.
- H. Venting shall be designed to drain to boiler condensate treatment tanks.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide double wall, insulated vent continuous from appliance outlet to exterior termination. Vent shall be sloped to drain to appliance condensate treatment tank. Provide all necessary connections and additional piping as required to allow system to drain to condensate treatment tanks where slope cannot be maintained.
- C. Install in accordance with recommendations of ASHRAE -Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and NFPA 54.
- D. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- E. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards Metal and Flexible for equivalent duct support configuration and size.
- F. Coordinate installation of dampers, and induced draft fans.
- G. For all double wall vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
- H. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement to ANSI/ASTM C105. Connect base section to foundation using anchor lugs.
- I. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
- J. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, chimneys, or stacks.
- K. No single wall vent connectors or breechings are permitted.

3.2 SCHEDULE

Equipment	Breeching	Chimney/Stack
Boiler	Steel	Type B

END OF SECTION

SECTION 23 52 16 - CONDENSING BOILERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Condensing Gas Boilers.
- B. Controls and Boiler Trim.
- C. Sequence of Operations.

1.2 RELATED SECTIONS

- A. Section 23 05 00 Common Work Results for HVAC.
- B. Section 23 05 16 Expansion Fittings and Loops for HVAC Piping.
- C. Section 23 05 29 Hangers and Supports for HVAC Piping and Equipment.
- D. Section 23 05 48 Vibration and Seismic controls for HVAC.
- E. Section 23 05 53 Identification for HVAC Piping, Ductwork and Equipment.
- F. Section 23 08 00 Commissioning of HVAC.
- G. Section 23 09 00 Instrumentation.
- H. Section 23 09 23 Direct Digital Control System for HVAC.
- I. Section 23 09 93 Sequence of Operation.
- J. Section 23 21 13 Hydronic Piping.
- K. Section 23 21 16 Hydronic Piping Specialties.
- L. Section 23 51 00 Breechings Chimneys and Stacks.
- M. Section 26 05 83 Wiring Connections.

1.3 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI Z21.13 Gas-fired Low Pressure Steam and Hot Water Boilers.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. American Society of Mechanical Engineers:
 - 1. ASME Section IV Boiler and Pressure Vessel Code Heating Boilers.

- 2. ASME Section VIII Boiler and Pressure Vessel Code Pressure Vessels.
- 3. ASME CSD-1 (Controls and Safety Devices).
- D. Hydronics Institute:
 - 1. H.I. Heating Boiler Standard Testing and Rating Standard for Heating Boilers.
- E. National Fire Protection Association:
 - NFPA 54 National Fuel Gas Code.

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Product Data: Include performance data, operating characteristics, furnished specialties and accessories.
 - 1. Prior to flue vent installation, engineered calculations and drawings must be submitted to Architect/Engineer to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted boiler.
- C. Efficiency Curves: At a minimum, submit efficiency curves for 100%, 60%, and 5% input firing rates at incoming water temperatures ranging from 60°F to 160°F. Test protocols shall conform to AERCO's AE 1 standards and shall be witnessed and reviewed by an independent, third party group.
- D. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of boiler.
 - 1. If submitted material is different from that of the design basis, boiler manufacture shall incur all costs associated with reselection of necessary pumps. Possible differences include, but are not limited to, the pump type, pump pad size, electrical characteristics and piping changes.
- E. Shop Drawings: For boilers, boiler trim and accessories, include:
 - 1. Plans, elevations, sections, details and attachments to other work.
 - 2. Wiring Diagrams for power, signal and control wiring.
- F. Source Quality Control Test Reports: Reports shall be included in submittals.
- G. Field Quality Control Test Reports: Reports shall be included in submittals.
- H. Submit data showing boiler burner, controls and boiler control panel wiring.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.
- B. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

C. Include reports from manufacturers field service testing.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.
- B. The equipment shall, at a minimum, be in strict compliance with the requirements of this specification and shall be the manufacturer's standard commercial product unless specified otherwise. Additional equipment features, details, accessories, appurtenances, etc. which are not specifically identified but which are a part of the manufacturer's standard commercial product, shall be included in the equipment being furnished.
- C. The equipment shall be of the type, design, and size that the manufacturer currently offered for sale and appears in the manufacturer's current catalogue. The equipment shall be new and fabricated from new materials and shall be free from defects in materials and workmanship.
- D. All units of the same classification shall be identical to the extent necessary to insure interchangeability of parts, assemblies, accessories, and spare parts wherever possible.
- E. In order to provide unit responsibility for the specified capacities, efficiencies, and performance, the boiler manufacturer shall certify in writing that the equipment being submitted shall perform as specified. The boiler manufacturer shall be responsible for guarantying that the boiler provides the performance as specified herein.

1.7 CERTIFICATIONS

- A. Manufacturer's Certification: The boiler manufacturer shall certify the following:
 - 1. The products and systems furnished are in strict compliance with the specifications.
 - 2. The boiler, burner and other associated mechanical and electrical equipment have all been properly coordinated and integrated to provide a complete and operable boiler.
 - ASME certification.
 - 4. UL certification.
 - 5. The specified factory tests have been satisfactorily performed.
 - 6. The specified field tests have been satisfactorily performed.
- B. Contractor's Certification: The contractor shall certify the following:
 - 1. The products and systems installed are in strict compliance with the specifications.
- C. Boiler Inspectors' Certification: All boiler inspections during hydrostatic testing shall be performed by an authorized boiler inspector who is certified by the National Board of Boiler and Pressure Vessel Inspectors and shall be submitted in writing prior to final acceptance by the engineer.

1.8 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70 code for internal wiring of factory wired equipment.

- B. Conform to ANSI/ASME SEC4 and SEC 8D for boiler construction.
- C. Units: AGA certified. UL labeled.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store. and protect products to site under provisions of Division 01.
- B. Accept boilers and accessories on site in factory shipping packaging. Inspect for damage.
- C. Protect boilers from damage by leaving packing in place until installation.
- D. Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.

1.10 WARRANTY

A. Provide one year warranty for the entire boiler under provisions of Division 01.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Aerco.
- B. Lochinvar.
- C. Substitutions: Under provisions of General Conditions in Division 01.

2.2 HIGH EFFICIENCY CONDENSING BOILERS

- A. Boiler shall be natural gas fired, fully condensing, fire tube design. Power burner shall have full modulation (the minimum firing rate shall not exceed 100,000 BTU/HR input. Boilers that have an input greater than 100,000 BTU/Hr at minimum fire will not be considered) and discharge into a positive pressure vent. Boiler efficiency shall increase with decreasing load (output), while maintaining setpoint. Boiler shall be factory-fabricated, factory-assembled and factory-tested, fire-tube condensing boiler with heat exchanger sealed pressure-tight, built on a steel base, including insulated jacket, flue-gas vent, combustion-air intake connections, water supply, return and condensate drain connections, and controls.
- B. Heat Exchanger: The heat exchanger shall be constructed of 439 stainless steel fire tubes and tubesheets, with a one-pass combustion gas flow design. The fire tubes shall be 5/8" OD, with no less than 0.049" wall thickness. The upper and lower stainless steel tubesheet shall be no less than 0.25" thick. The pressure vessel/heat exchanger shall be welded construction. The heat exchanger shall be ASME stamped for a working pressure not less than 160 psig. Access to the tubesheets and heat exchanger shall be available by burner and exhaust manifold removal. Minimum access opening shall be no less than 10-inch diameter.
- C. Pressure Vessel. The pressure vessel shall have a maximum water volume of 44 gallons. The boiler water pressure drop shall not exceed 3 psig at 170 gpm. The boiler water connections shall be 4-inch flanged 150-pound, ANSI rated. The pressure vessel shall be constructed of SA53 carbon steel, with a 0.25 inch thick wall and 0.50-inch thick upper head. Inspection openings in the pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The boiler shall be designed so that the thermal efficiency increases as the boiler firing rate decreases.

- D. Modulating Air/Fuel Valve and Burner. The boiler burner shall be capable of a 20-to-1 turndown ratio of the firing rate without loss of combustion efficiency or staging of gas valves. The burner shall produce less than 13 ppm of NOx corrected to 3% excess oxygen. The burner shall be metal fiber mesh covering a stainless steel body with spark ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. The modulating motor must be linked to both the gas valve body and air valve body with a single linkage. The linkage shall not require any field adjustment. A variable frequency drive (VFD), controlled cast aluminum pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.
- E. Exhaust Manifold: The exhaust manifold shall be of corrosion resistant cast aluminum or 316 stainless steel with an 6 inch diameter flue connection. The exhaust manifold shall have a collecting reservoir and a gravity drain for the elimination of condensation.
- F. Blower: The boiler shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.
- G. Ignition: Ignition shall be via spark ignition with 100 percent main-valve shutoff and electronic flame supervision.
- H. Gas train: Supply boilers with FM Approved Gas Train and gas pressure regulator.
- I. Motorized Valve: Provide boiler with 4" motorized isolation valve, rated for 50 psi, ANSI flange, actuator compatible with boiler control system.
- J. Electrical requirements: Provide single point connection for each unit for all 120v single phase and 24V low voltage power requirements.
- K. The boiler control system shall be segregated into three components: "C-More" Control Panel, Power Box and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized.
- L. The control panel shall consist of six individual circuit boards using state-of-the-art surface-mount technology in a single enclosure. These circuit boards shall include:
 - 1. A display board incorporating LED display to indicate temperature and a vacuum fluorescent display module for all message enunciation.
 - 2. A CPU board housing all control functions.
 - 3. An electric low-water cutoff board with test and manual reset functions.
 - 4. A power supply board.
 - 5. An ignition /stepper board incorporating flame safeguard control.
 - 6. A connector board.
 - 7. Each board shall be individually field replaceable.
- M. The combustion safeguard/flame monitoring system shall use spark ignition and a rectification-type flame sensor.

- N. The control panel hardware shall support both RS-232 and RS-485 remote communications for Modbus interface to the DDC system, coordinate with Section 23 09 93.
- O. The controls shall annunciate boiler and sensor status and include extensive self-diagnostic capabilities that incorporate a minimum of eight separate status messages and 34 separate fault messages.
- P. The control panel shall incorporate three self-governing features designed to enhance operation in modes where it receives an external control signal by eliminating nuisance faults due to over-temperature, improper external signal or loss of external signal. These features include:
 - 1. Setpoint high limit: Allows for a selectable maximum boiler outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degree selectable band from the desired maximum boiler outlet temperature.
 - 2. Setpoint Low Limit: Allows for a selectable minimum operating temperature.
 - 3. Failsafe Mode: Failsafe mode allows the boiler to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.
- Q. The boiler control system shall incorporate the following additional features for enhanced external system interface:
 - 1. System start temperature feature.
 - 2. Pump delay timer.
 - 3. Domestic hot water priority.
 - 4. Auxiliary start delay timer.
 - 5. Auxiliary temperature sensor.
 - 6. Analog output feature to enable simple monitoring of temperature setpoint, outlet temperature or fire rate.
 - Remote interlock circuit.
 - 8. Delayed interlock circuit.
 - 9. Fault relay for remote fault alarm.
- R. Each boiler shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each boiler shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD 1.
- S. Each boiler shall have an oxygen monitoring system that will measure the oxygen content of the exhaust gasses in real-time. Output of O2 information shall be displayed on the C-More control panel.

- T. Each boiler shall have integrated Boiler Sequencing Technology (BST), capable of multi-unit sequencing with lead-lag functionality and parallel operation. The system will incorporate the following capabilities:
 - 1. Efficiently sequence 2-to-8 units on the same system to meet load requirement.
 - 2. Integrated control and wiring for seamless installation of optional isolation valve. When valves are utilized, the system shall operate one motorized valve per unit as an element of load sequencing. Valves shall close with decreased load as units turn off, minimum of one must always stay open for recirculation.
 - 3. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize unit run hours.
 - 4. Designated master control, used to display and adjust key system parameters.
 - 5. Automatic bump-less transfer of master function to next unit on the chain in case of designated master unit failure; master/slave status should be shown on the individual unit displays.
 - 6. Designated master control, used to display and adjust key system parameters.
- U. Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the boiler.
- V. The contractor shall supply and install fire side condensate neutralizing tubes for each boiler condensate drain and all flue pipe condensate drain connections. The condensate tubes shall be designed to elevate the PH level of the boiler and flue condensate to a minimum of 3 PH above the boiler and flue condensate PH level or between 6.2 and 7.2 PH. The tubes shall be sized per manufacturer's recommendation. Neutralizer Agent: 1/2" to 3/4" aggregate calcium carbonate, provide initial fill and 50 lbs. extra stock.

2.3 HIGH EFFICIENCY CONDENSING BOILER VENTING

A. Unit venting shall be UL Listed for use with Category III and IV appliances. Vent material shall be AL-294C stainless steel.

1.2 BOILER SEQUENCE OF OPERATIONS

A. Automated Control:

1. Hydronic Loop Temperature: Boilers control panel supplied with the boiler equipment shall enable/disable boilers and modulate firing rate between 0-100% to maintain Header Supply temperature setpoint. The system hydronic loop temperature based on an adjustable outside air temperature reset schedule. Initial settings as follows

Outside Temperature	Loop HWS Temperature
0° F	180° F
60° F	100° F

- 2. The intent is to operate the boiler system at the lowest temperature possible to maximize boiler efficiency. Boiler control panel to modulate boilers at lowest possible input to maintain loop temperature.
- 3. Emergency Boiler Shutdown: Provide resettable red pushbutton for emergency shutdown of boilers. Hardwire interlock pushbutton to disable all boilers when button is pressed. Provide red placard above pushbutton to read "Emergency Boiler Shutdown".
- 4. Domestic Hot Water Priority:
 - a. Boiler shall monitor domestic hot water system and upon demand shall start heating water circulation pump, CP-3.
- 5. Air Handler Heating Coil:
 - a. Boiler shall monitor auxiliary heat system and upon demand shall start heating water circulation pump, CP-4.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in strict accordance with manufacturer's installation instructions.
- B. Install equipment in strict compliance with state and local codes and applicable NFPA standards.
- C. Maintain manufacturer's recommended clearances around sides and over top of equipment.
- D. Install components that were furnished loose with equipment for field installation.
- E. Provide all interconnecting electrical control and power wiring. Provide for connection to electrical service.
- F. Provide all piping for boiler pipe connections.
- G. Pipe relief valves to 6" above finished floor [glycol tank].
- H. Pipe condensate drains to acidic condensate neutralizer. Provide p-trap upstream of neutralizer. All piping shall be PVC and supplied/installed by the contractor. Plastic tubing is an acceptable alternative when used with barbed fittings. All PVC joints shall be glued in place and all barbed fittings shall be secured with tie wraps. All neutralizing tubes shall be secured to the floor or wall so as not to be exposed to damage or within a normal walkway. The contractor shall fill all "P-traps" and neutralizing tubes with tap water before the firing of any boiler.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Division 01. Instruct operating personnel.
- B. Submit written report after start-up including control settings and performance chart of control system.
- C. Coordinate all work with Specification Section 23 09 23 and 23 09 93. Perform start-up in conjunction with testing of BAS systems to insure interface between boiler controls and BAS controls are complete and fully functional. Verify system operation in accordance with the sequence of operation.

- D. Commission Boilers per manufacturer's recommendations provide field start-up service by factory certified boiler technician.
- E. Equipment inspection: Boiler manufacturer's representative to provide jobsite assistance to inspect boilers and other equipment verifying completeness of equipment supplied. Casing, insulation and boiler mounted controls shall ship loose for field assembly by Manufacturer's Representative after boiler has been set and mounted on legs by installing contractor. Installing contractor shall provide laborer for assistance.
- F. Start-up shall be conducted by experienced and factory authorized technician in the regular employment of the boiler supplier, and shall include the following:
 - 1. Demonstrate that boiler, burner, controls and accessories comply with requirements of this Section as proposed by the boiler and accessories supplier. Pre-test all items prior to scheduling the final testing that will be witnessed by the test engineer.
 - 2. Readings at different firing rates (20, 50, 75 and 100%) of load for the modulating burner shall be taken with a written report of the tests submitted to the engineer. The reports shall include readings for each firing rate tested and shall include stack temperatures, O2, CO, NOx, and overall boiler efficiency.
 - Auxiliary Equipment and Accessories: Observe and check all valves, draft fans and electric
 motors, as well as other accessories and appurtenant equipment during the operational and
 capacity tests for leakage, malfunctions, defects, and non-compliance with referenced
 standards or overloading as applicable.
- G. Substantial Completion Demonstration Requirements:
 - 1. Fireside inspection.
 - 2. Set up fuel train and combustion air system.
 - 3. Set up operating set points.
 - 4. Check all safeties, including: Flame safeguard, LWCO, ALWCO, Air flow, Fuel pressures, High limits.
 - 5. Set up and verify efficiencies at 20%, 50%, 75%, and 100%.
 - 6. Set up and verify burner turndown.
 - 7. Training to include all safety procedures, maintenance procedures, control operations, and diagnostic procedures. Training to be provided in a single 4 hour continuous session to accommodate operator's availability on site.
- H. Submit written report after start-up including control settings and performance chart of control system.

END OF SECTION

100% CONSTRUCTION DRAWINGS - APRIL 14TH, 2023

KENAI VINTAGE POINT HOUSING BOILER AND CONTROLS REPLACEMENT

FOR THE

CITY OF KENAI

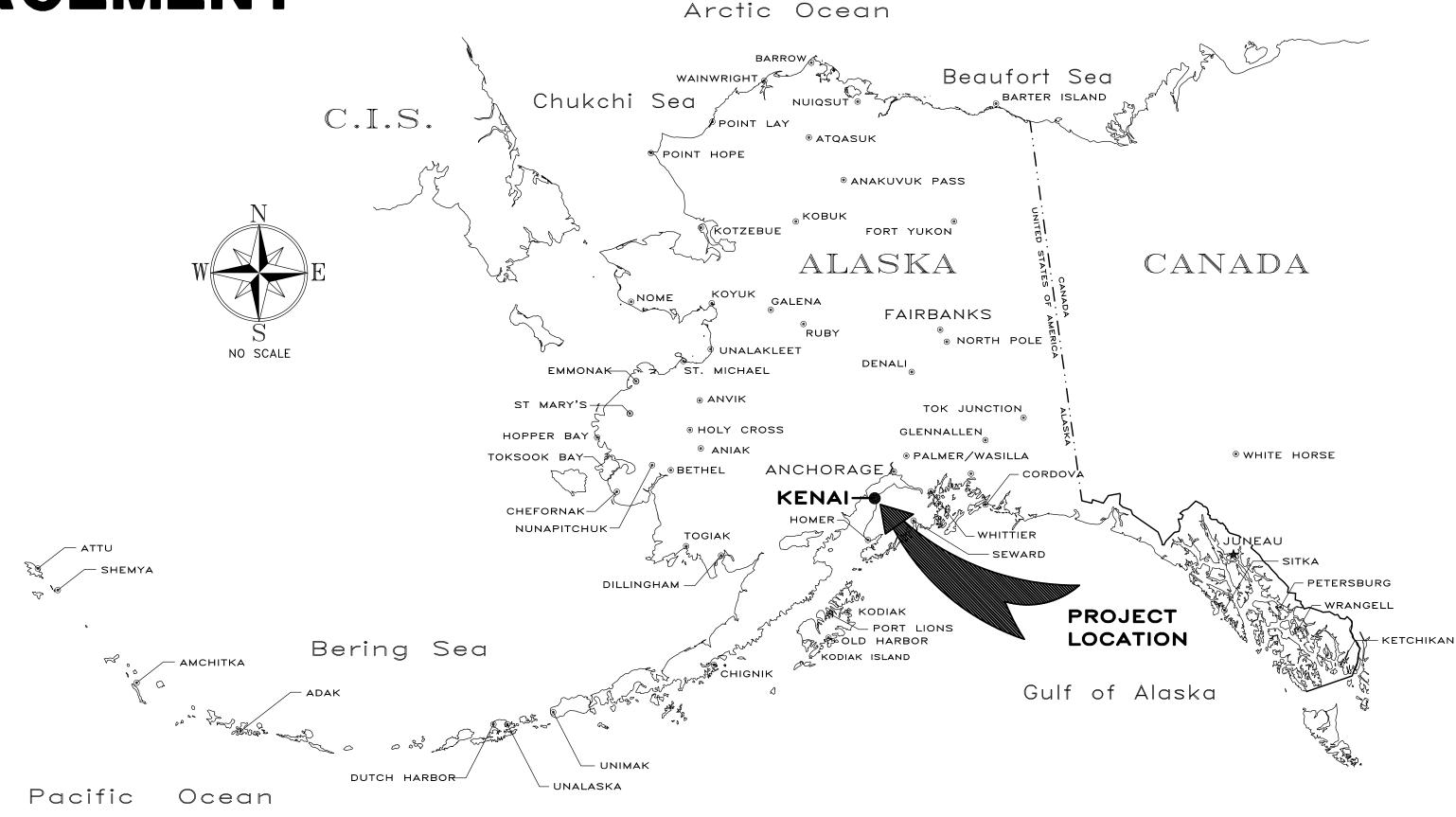
SCOPE OF WORK

THE SCOPE OF THIS PROJECT ENTAILS THE REPLACEMENT OF THE EXISTING BOILER AND BOILER PUMPS WITH HIGH EFFICIENCY CONDENSING BOILERS AND VARIABLE SPEED PUMPS.

THE FOLLOWING WORK SHALL BE ADDITIVE ALTERNATES:

ADD ALT #1: ADDITION OF NEW STANDBY GENERATOR AT FACILITY EXTERIOR

AND TRANSFER SWITCH INSIDE THE FACILITY.



Pacific Ocean

DRAWING INDEX

MECHANICAL

MO01 MECHANICAL LEGENDS, ABBREVIATIONS, AND SCHEDULES

M101 BOILER ROOM DEMOLITION AND PIPING SCHEMATIC

M102 DEMOLITION SCHEMATIC AND DETAILS

M201 FIRST FLOOR HVAC REMODEL

M202 BOILER ROOM REMODEL AND PIPING SCHEMATIC

M301 MECHANICAL SCHEMATICS AND DETAILS

ELECTRICAL

E001 ELECTRICAL LEGEND & ONE-LINE DIAGRAMS

E002 ADD ALT. #1 ELECTRICAL SITE PLAN

E101 BASE BID ELECTRICAL PLANS

E102 ADD ALT #1 ELECTRICAL PLANS

E201 PANEL SCHEDULES ELECTRICAL PLANS

CITY OF KENAI - ORDINANCE NO. 3333-2023

AN ORDINANCE AMENDING KENAI MUNICIPAL CODE 8.05.101 — ADOPTION OF FIRE PREVENTION STANDARDS, AND REPEALING AND REPLACING KENAI MUNICIPAL CODE 8.05.030 — LOCAL AMENDMENTS TO THE 2009 INTERNATIONAL FIRE CODE, TO ADOPT THE 2021 INTERNATION FIRE CODE WITH LOCAL AMENDMENTS.

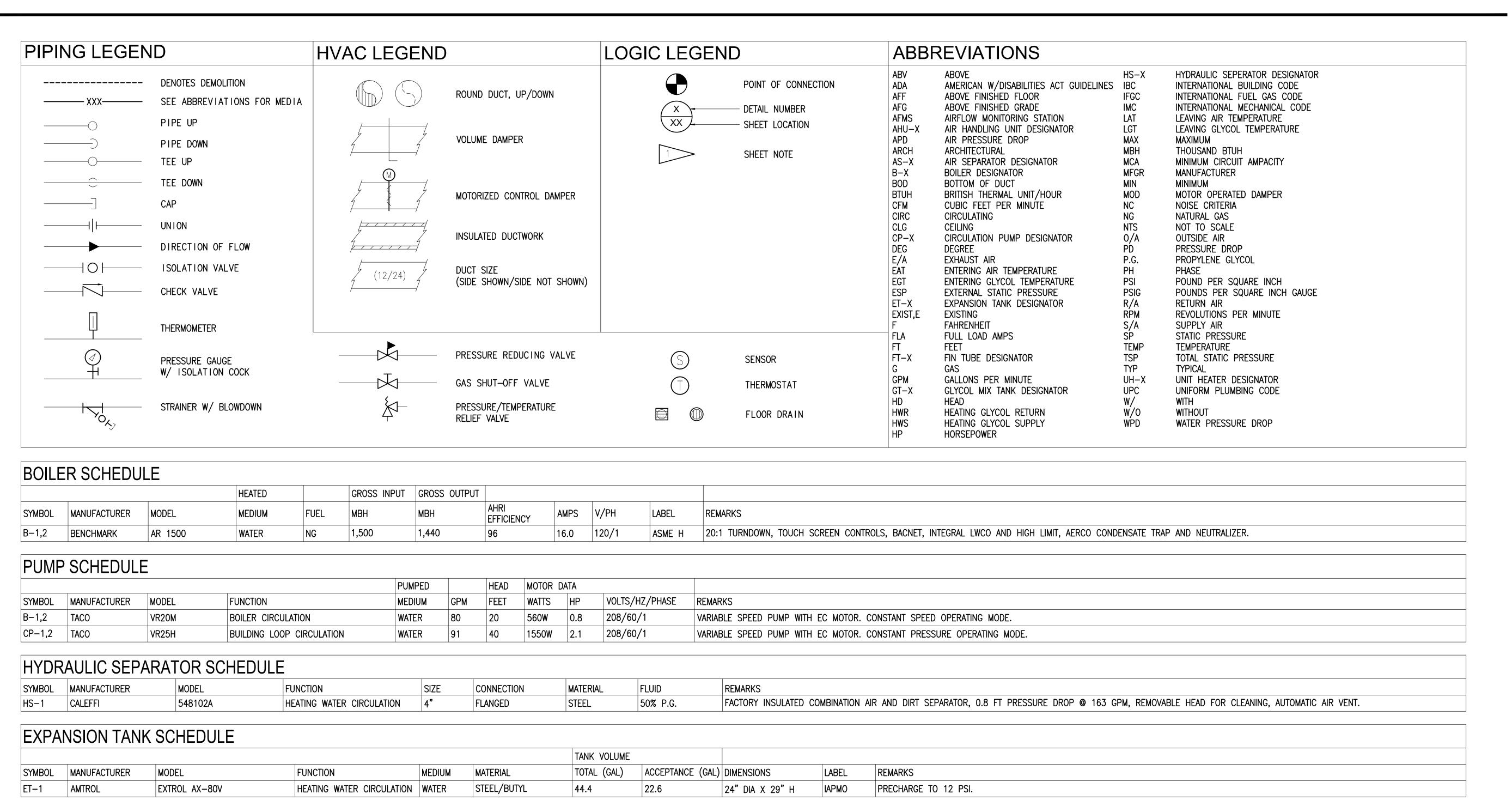
CITY OF KENAI - ORDINANCE NO. 3334-2023

AN ORDINANCE AMENDING KENAI MUNICIPAL CODE TITLE 4—UNIFORM CODES, TO ADOPT THE 2021 EDITIONS OF THE INTERNATIONAL BUILDING CODE, INTERNATIONAL RESIDENTIAL CODE, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL FUEL GAS CODE, UNIFORM PLUMBING CODE, INTERNATIONAL EXISTING BUILDING CODE, INTERNATIONAL PROPERTY MAINTENANCE CODE AND THE 2020NATIONAL ELECTRICAL CODE AND INCORPORATE LOCAL AMENDMENTS.



Engineering, Inc.

MECHANICAL AND ELECTRICAL CONSULTING ENGINEERS 670 West Fireweed Lane, Suite 200 Anchorage, AK 99503 Phone (907) 276-0521 Corporate No.: AECC542



ME-135263

AOFESSIONA

Engineering, Incompage, AK 99503
Phone (907) 276-0521
Corporate NO : AEC CEA2

EP

 $\overline{\mathbf{C}}$

VINTAGE POINT HOUSING BOILER
CITY OF KENAI
210 FIDALGO AVE,
ALASKA 99611

REVISIONS:

DRAWN BY: KSP

CHECKED BY: MRB

DATE: 4/14/2023

JOB NUMBER: M2229

DWG FILE:

DRAWING TITLE:

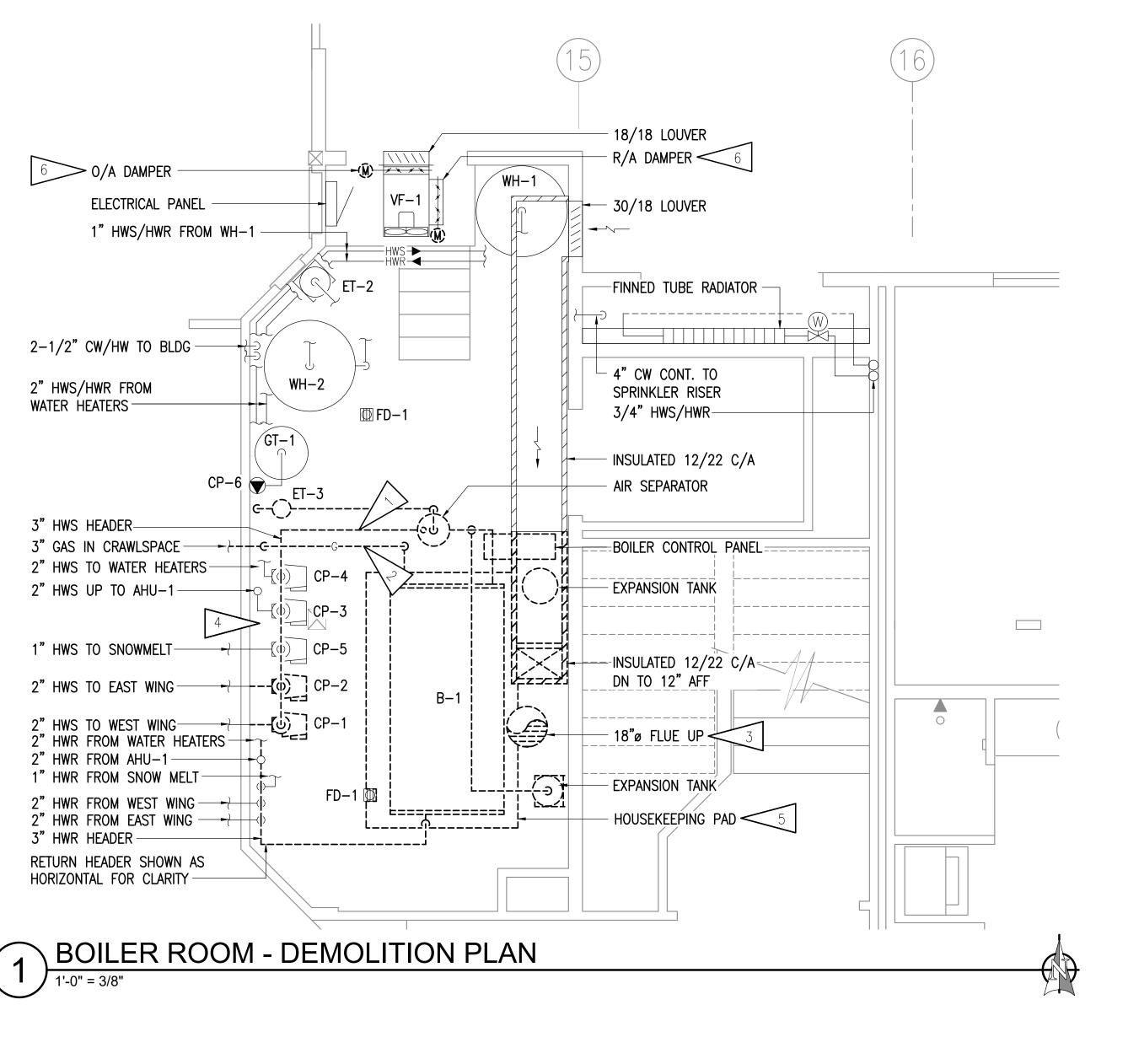
MECHANICAL LEGENDS,

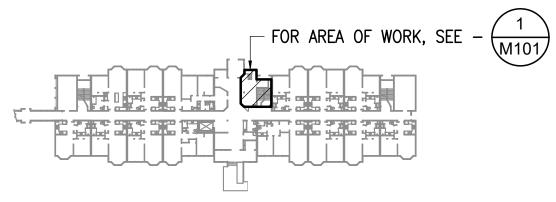
ABBREVIATIONS,

AND SCHEDULES

M001

100%





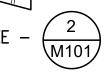
FIRST FLOOR KEY PLAN NO SCALE

GENERAL NOTES:

- THE INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM AS BUILT DRAWINGS AND A NON-DESTRUCTIVE WALK THROUGH OF THE FACILITY. THERE IS NO WARRANTY OR GUARANTEE AS TO THE ACCURACY OF THE INFORMATION SHOWN HERE-IN. THE CONTRACTOR SHALL FIELD VERIFY ALL ITEMS SCHEDULED FOR DEMOLITION PRIOR TO START OF WORK.
- B. DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED. SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.

SHEET NOTES:

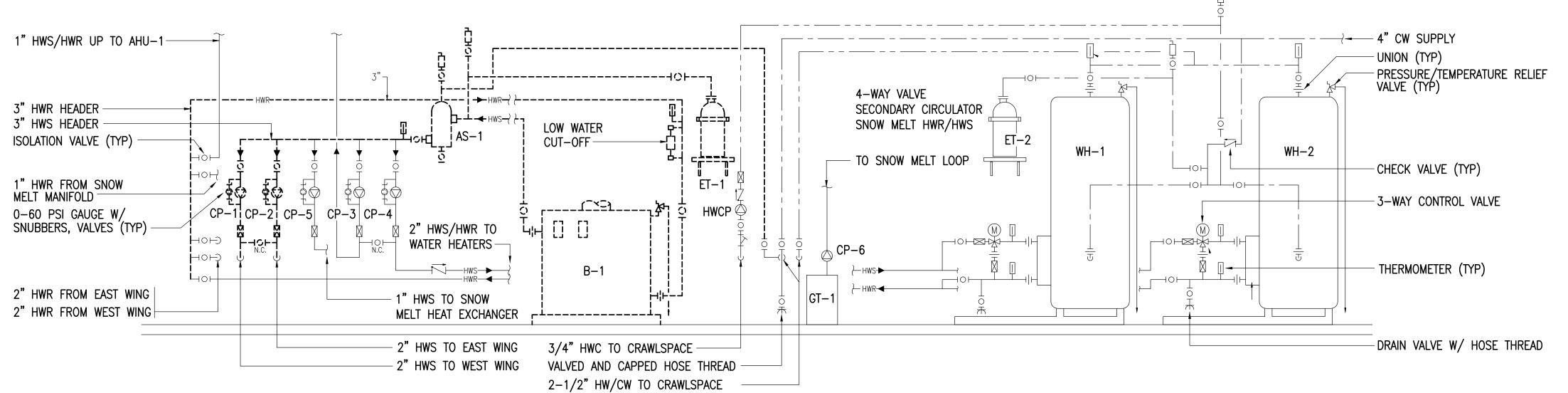
1. FOR DEMOLITION PIPING SCHEMATIC, SEE -



2. DEMOLISH GAS PIPING BACK TO GAS METER. FOR GAS PIPING DEMOLITION SCHEMATIC, SEE -

3. FOR BOILER FLUE DEMOLITION DETAIL, SEE -

- 4. PUMP RACK TO REMAIN, NOT SHOWN FOR CLARITY.
- 5. DEMOLISH HOUSEKEEPING PAD IN ITS ENTIRETY. ADJACENT FLOOR DRAIN TO REMAIN.
- 6. REMOVE ABANDONED DAMPER ACTUATORS AND ALL ASSOCIATED WIRING.



BOILER ROOM - DEMOLITION PLAN PIPING SCHEMATIC
NO SCALE



REPL ER. \Box HOUSING LNIO <u></u>

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REVISIONS:

DRAWN BY: KSP CHECKED BY: MRB 4/14/2023 JOB NUMBER: M2229

DWG FILE:

DRAWING TITLE: **BOILER ROOM** DEMOLITION AND PIPING SCHEMATIC

100%

REPL BOILER OINT HOUSING VINTAGE P

REVISIONS:

DRAWN BY: KSP CHECKED BY: MRB 4/14/2023

JOB NUMBER: M2229

DWG FILE:

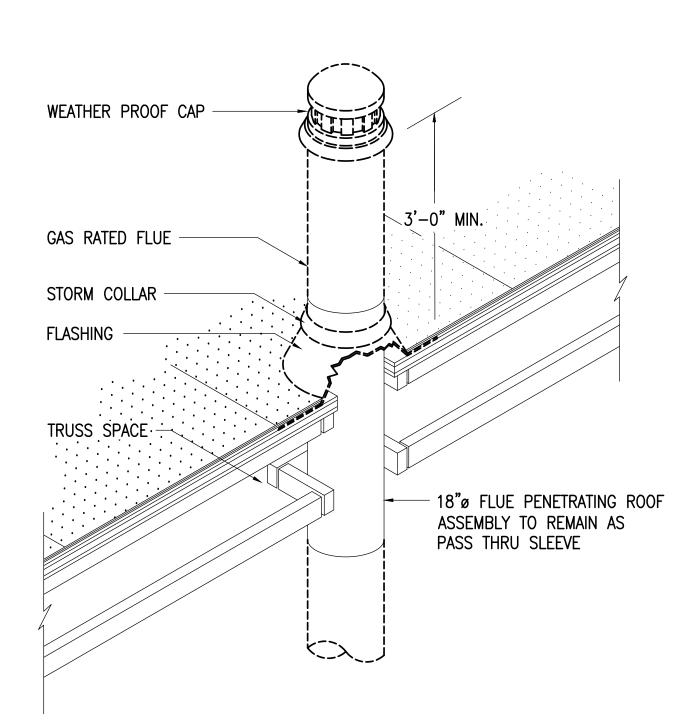
DEMOLITION SCHEMATIC AND DETAILS

100%

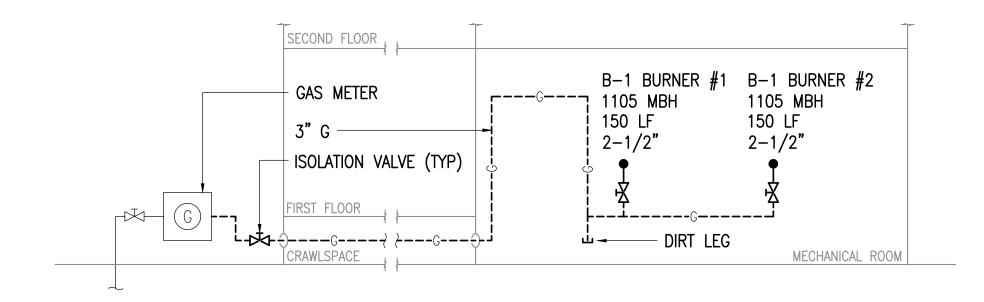
M102

GENERAL NOTES:

- A. THE INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM AS BUILT DRAWINGS AND A NON-DESTRUCTIVE WALK THROUGH OF THE FACILITY. THERE IS NO WARRANTY OR GUARANTEE AS TO THE ACCURACY OF THE INFORMATION SHOWN HERE-IN. THE CONTRACTOR SHALL FIELD VERIFY ALL ITEMS SCHEDULED FOR DEMOLITION PRIOR TO START OF WORK.
- B. DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED. SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.



BOILER FLUE DEMOLITION DETAIL
NO SCALE



GAS PIPING DEMOLITION SCHEMATIC
NO SCALE

REPL

SOILER

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OUSING

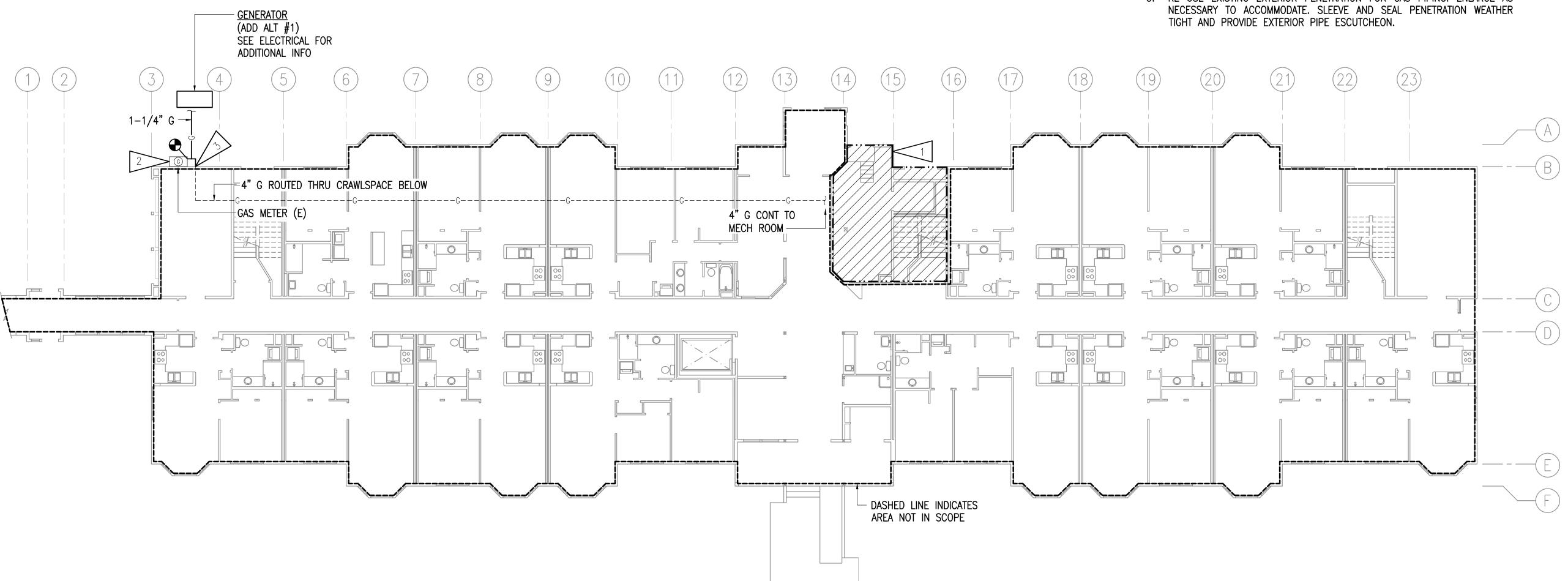
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OINT

A. THE INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM AS BUILT DRAWINGS AND A NON-DESTRUCTIVE WALK THROUGH OF THE FACILITY. THERE IS NO WARRANTY OR GUARANTEE AS TO THE ACCURACY OF THE INFORMATION SHOWN HERE-IN.

SHEET NOTES:

- 1. FOR ENLARGED MECHANICAL ROOM REMODEL PLAN, SEE -
- 2. CONTRACTOR TO COORDINATE WITH LOCAL UTILITY COMPANY TO RESIZE GAS METER AS NECESSARY FOR ADDITIONAL LOAD. FOR GAS PIPING SCHEMATIC, SEE - 4 M301
- 3. RE-USE EXISTING EXTERIOR PENETRATION FOR GAS PIPING. ENLARGE AS NECESSARY TO ACCOMMODATE. SLEEVE AND SEAL PENETRATION WEATHER



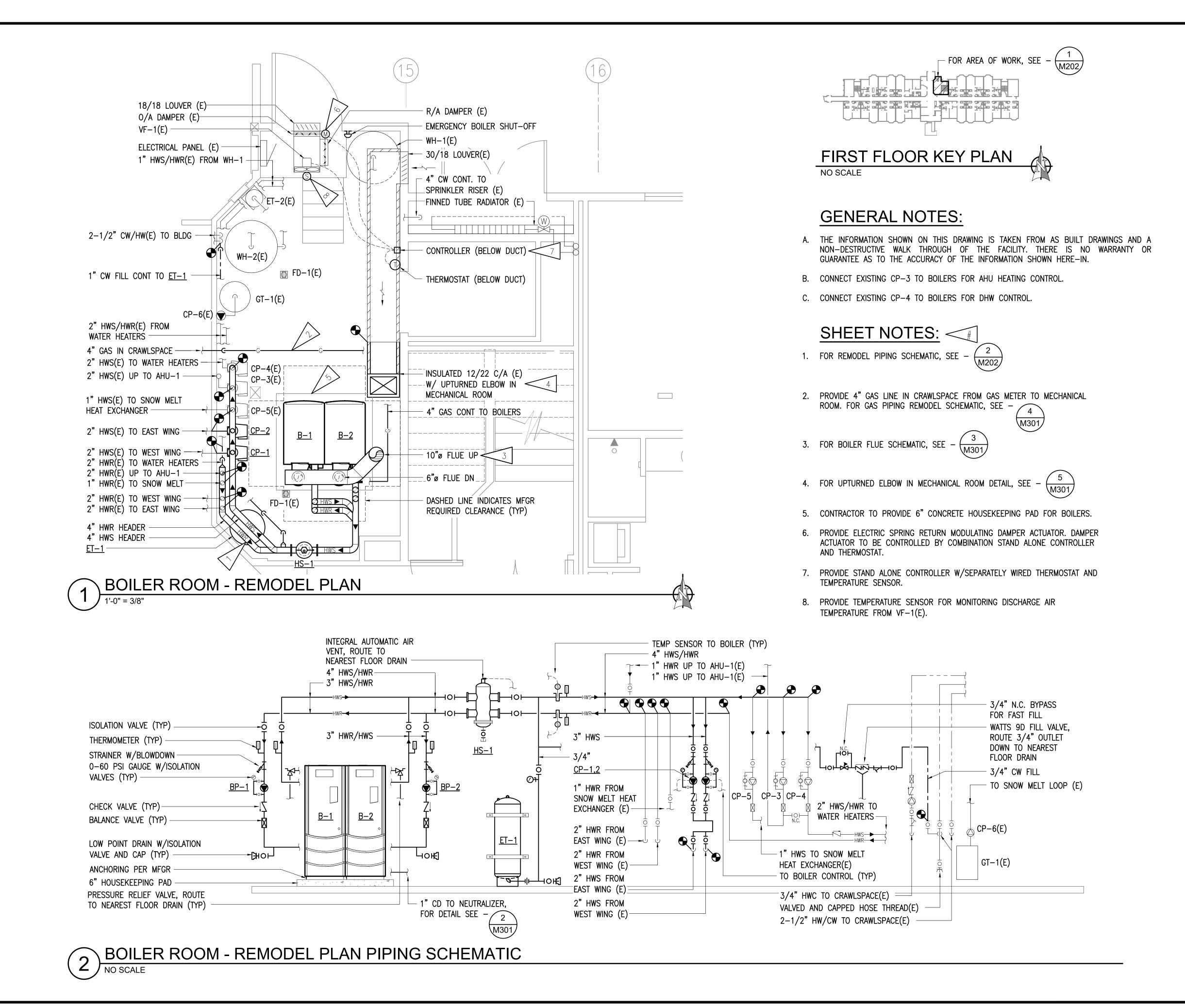
FIRST FLOOR HVAC REMODEL PLAN

REVISIONS:

CHECKED BY: MRB JOB NUMBER: M2229

DRAWING TITLE: FIRST FLOOR HVAC REMODEL

100%



ME-135263

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ANICAL AND ELECTRICAL CONSULTING

REPL

BOILER HOUSING LNIO Ω VINTAGE 0

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REVISIONS:

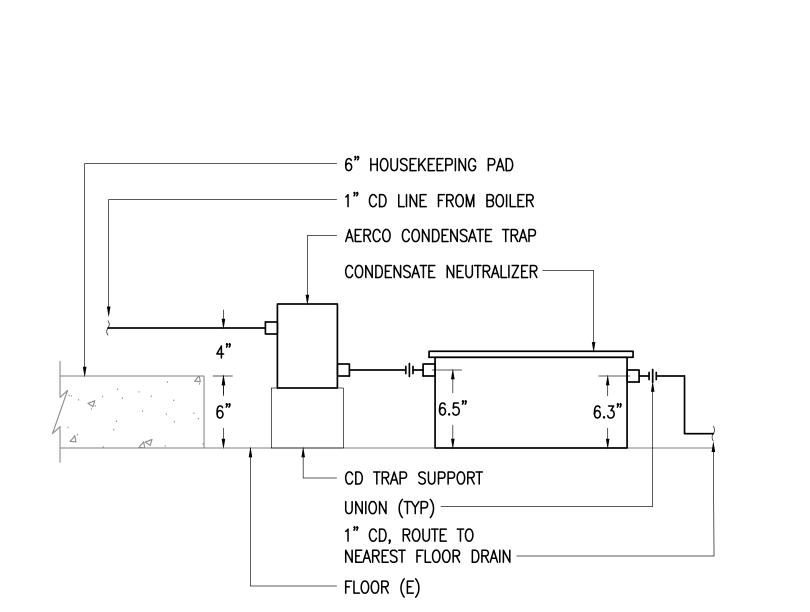
DRAWN BY: KSP CHECKED BY: MRB 4/14/2023

JOB NUMBER: M2229

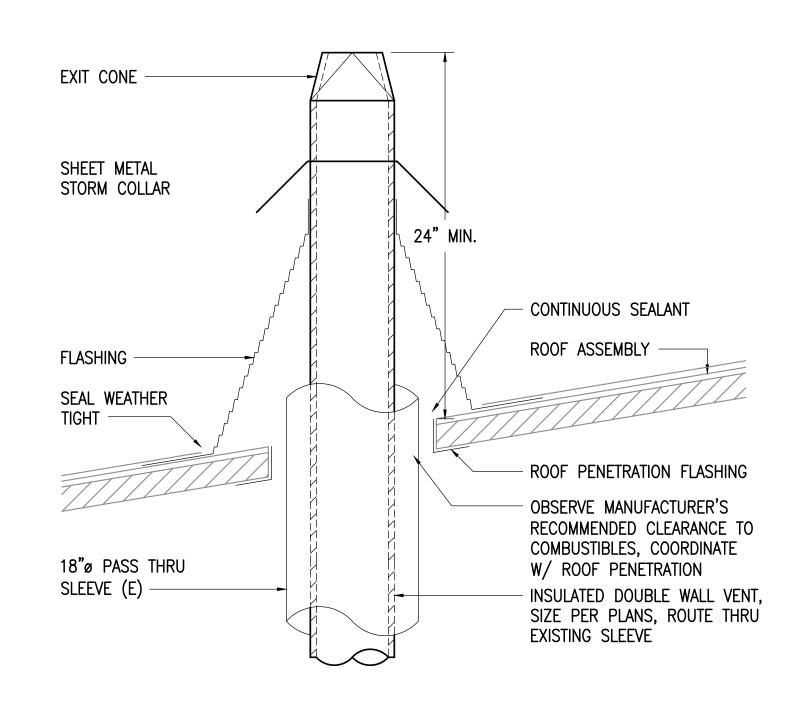
DRAWING TITLE: **BOILER ROOM** REMODEL AND PIPING SCHEMATIC

DWG FILE:

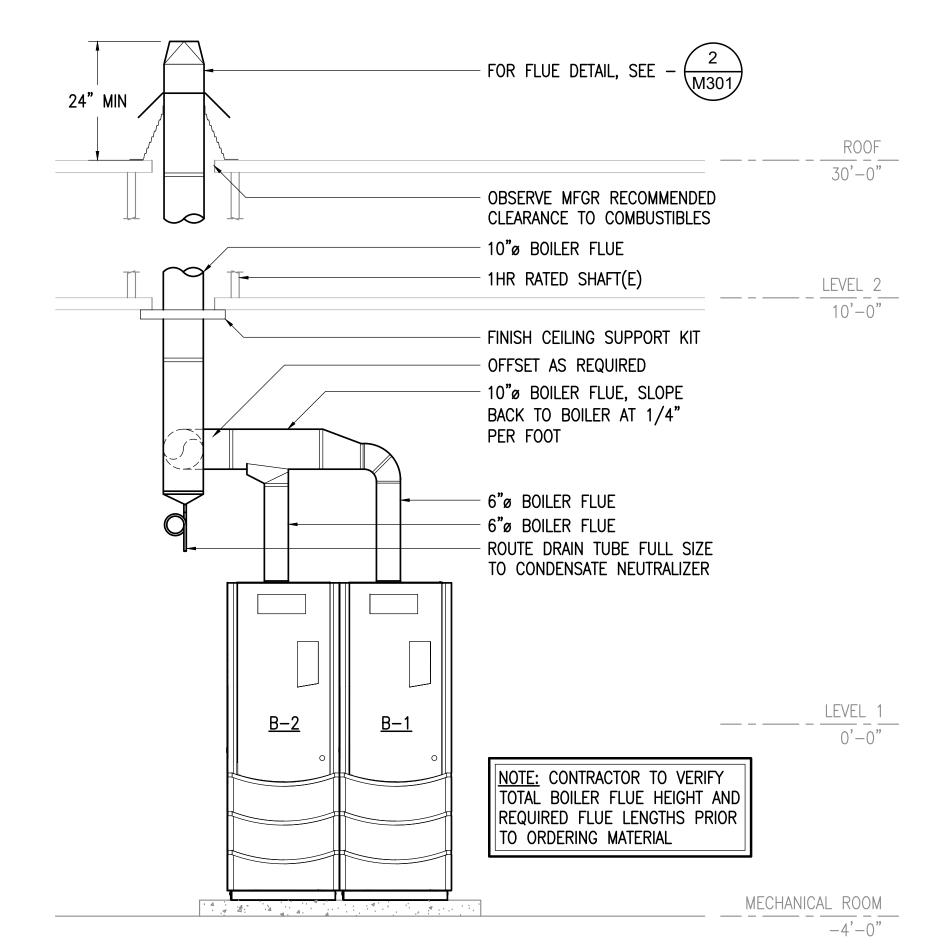
100%



CONDENSATE NEUTRALIZER DETAIL



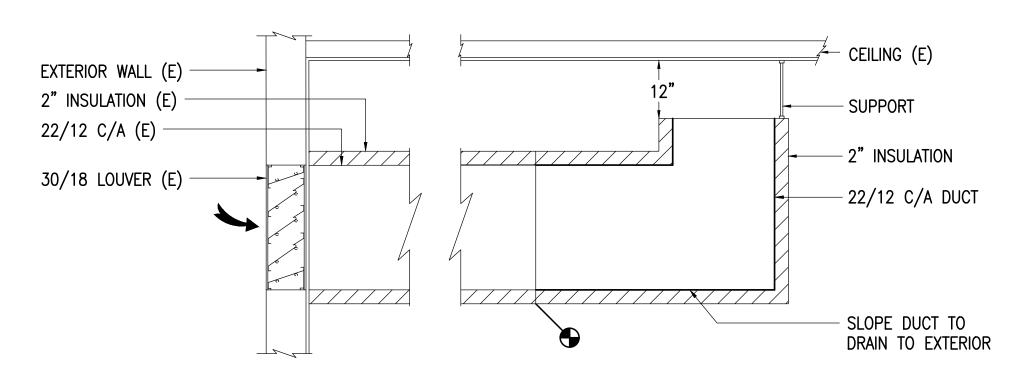
BOILER FLUE REMODEL DETAIL NO SCALE



BOILER FLUE SCHEMATIC

GAS SIZING PARAMETERS
GAS PRESSURE: 7" W.C. TOTAL DEVELOPED LENGTH: 150'
TOTAL CONNECTED LOAD: 3,375 CF
PIPING SIZED PER IFGC TABLE 402.4(1) 150' 3,375 CFH SECOND FLOOR GENERATOR
(ADDITIVE ALTERNATE #1)
375 MBH
30 LF - 4" G - ISOLATION VALVE (TYP) - UNION (TYP) 1-1/4" <u>B-1</u> 1500 MBH 150 LF 1500 MBH 150 LF MECHANICAL ROOM DIRT LEG (TYP) - GAS METER(E)

GAS PIPING REMODEL SCHEMATIC
NO SCALE



5 UPTURNED ELBOW DETAIL
NO SCALE

**ME-133063

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BOILER HOUSING OINT **VINTAGE P**

REPL

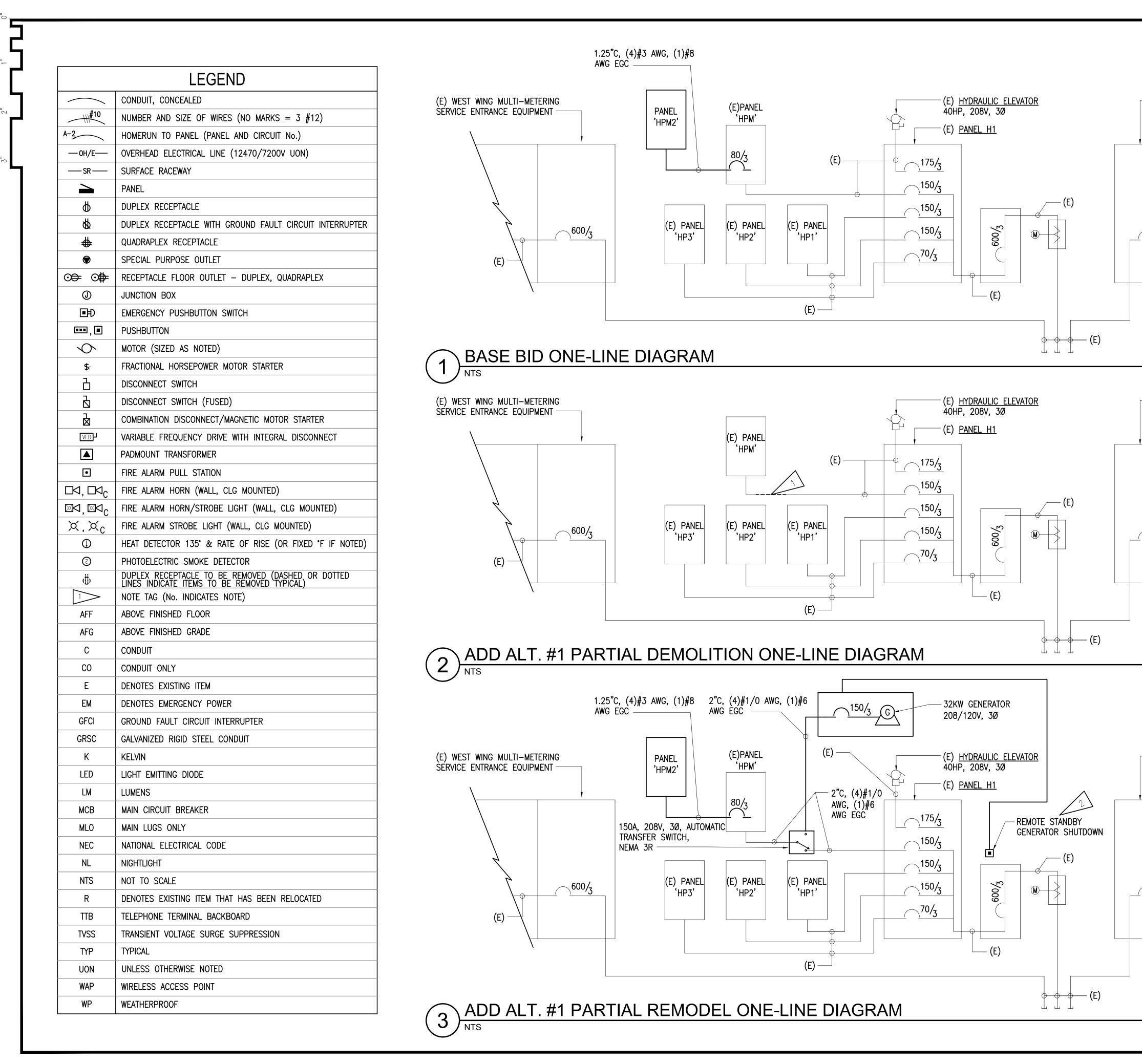
REVISIONS:

DRAWN BY: KSP

CHECKED BY: MRB 4/14/2023 JOB NUMBER: M2229 DWG FILE:

DRAWING TITLE: MECHANICAL SCHEMATICS AND DETAILS

100%





(E) EAST WING MULTI-METERING

(E) EAST WING MULTI-METERING

(E) EAST WING MULTI-METERING

SÉRVICE ENTRANCE EQUIPMENT

SHEET NOTES:

1. INTERCEPT FEEDER AND DEMOLISH AS REQUIRED

2. SEE DETAIL 2/E201 FOR REMOTE STANDBY

GENERATOR SHUTDOWN DETAIL.

TO PREPARE FOR INSERTION OF ATS IN SYSTEM.

SÉRVICE ENTRANCE EQUIPMENT

SÉRVICE ENTRANCE EQUIPMENT

600/3

600/3

600/3

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REPL

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REVISIONS:

DRAWN BY: NVF CHECKED BY: SB 4/14/2023 JOB NUMBER: M2229

DRAWING TITLE

DWG FILE:

ELECTRICAL LEGEND & ONE-LINE DIAGRAMS

E001

100%

- 1. ALL ITEMS SHOWN ON THIS SHEET ARE PART OF ADD ALT #1
- 2. ALL CONDUIT TO AND FROM THE GENERATOR ARE TO BE ROUTED UNDERGROUND OR THROUGH ACCESSIBLE CRAWLSPACE.

SHEET NOTES:

- PROVIDE (1) 1" CONDUIT BETWEEN GENERATOR AND AUTOMATIC TRANSFER SWITCH FOR ROUTING OF CONTROL CABLING. PROVIDE WIRING AS REQUIRED BY MANUFACTURER.
- 2. SEE 1/E201 FOR GENERATOR CONCRETE PAD DETAIL. VERIFY ALL REQUIREMENTS WITH A STRUCTURAL ENGINEER.



REPL

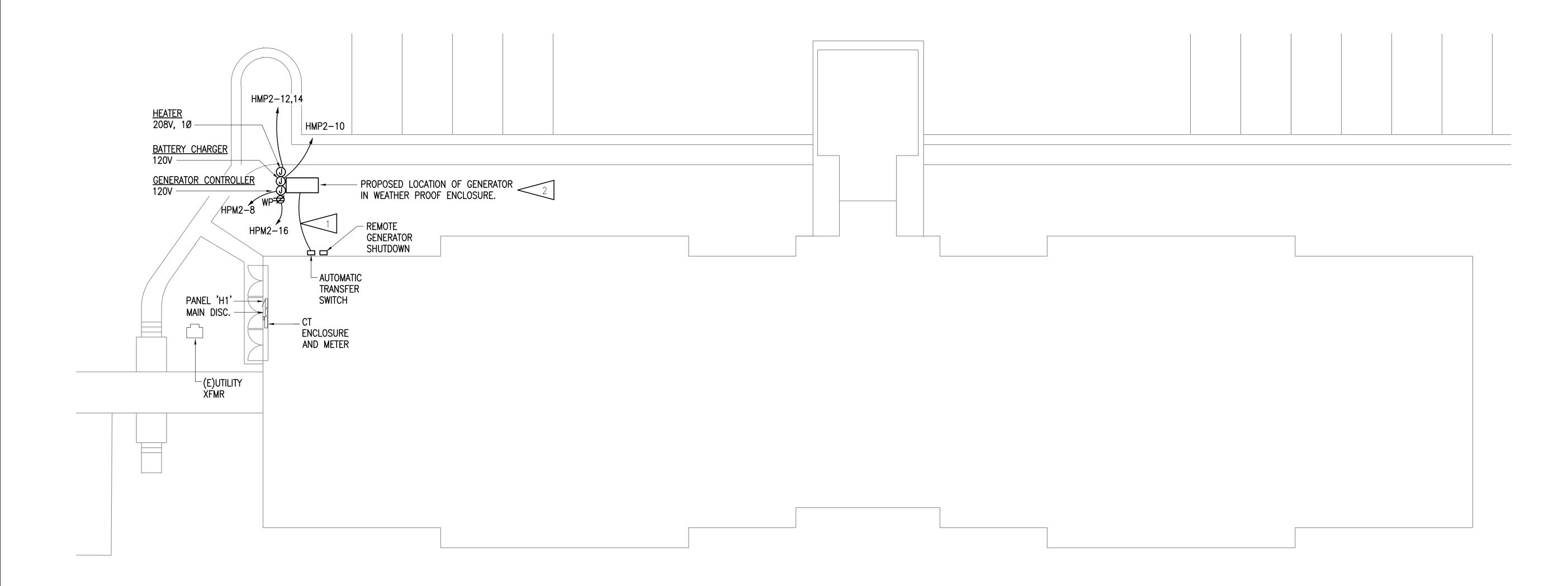
BOILER OINT HOUSING

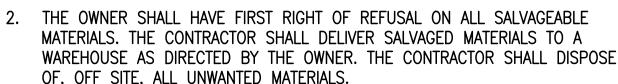
JOB NUMBER: M2229

ADD ALT. #1 ELECTRICAL SITE PLAN

100%

E002

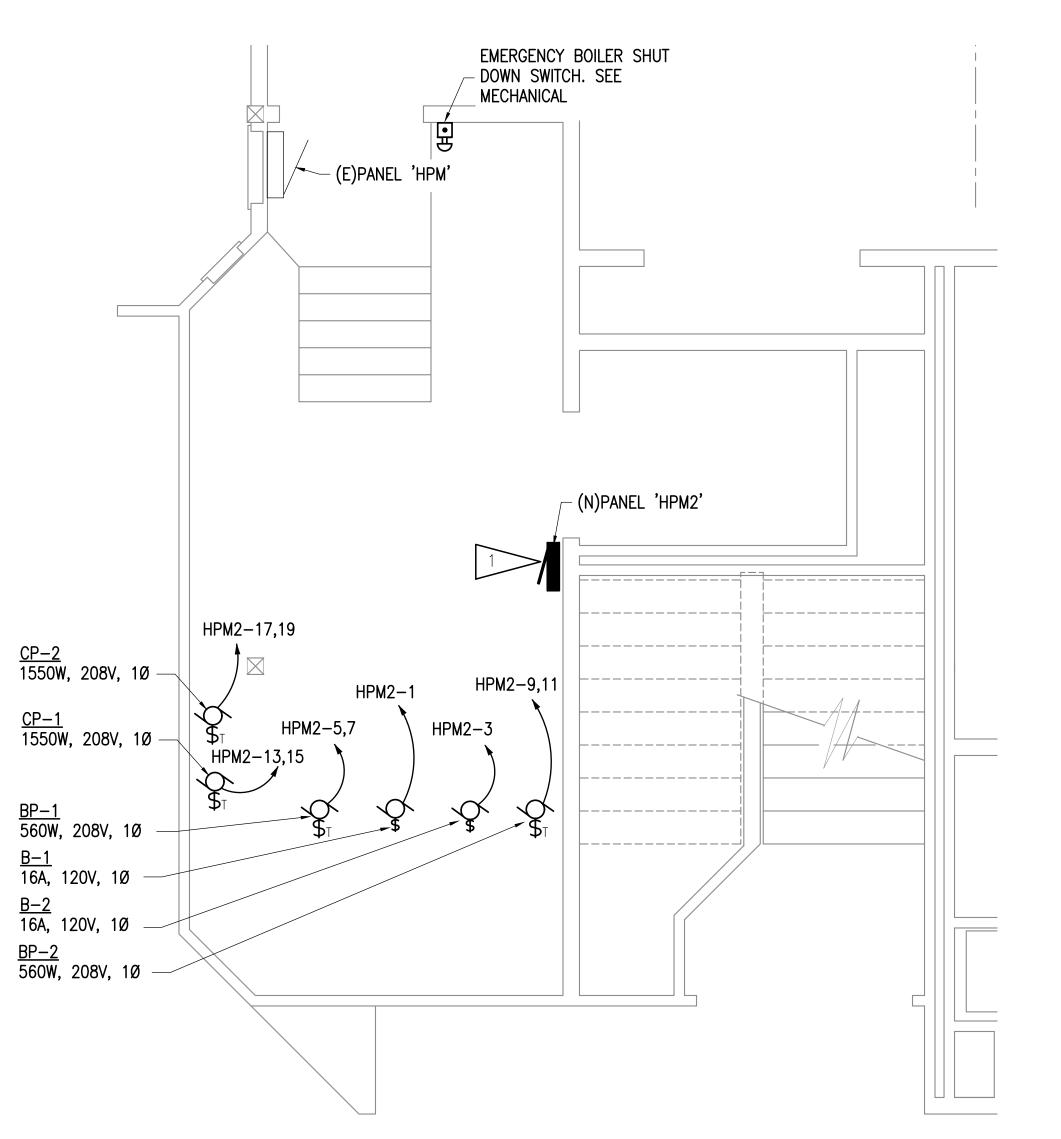




- 3. DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED. SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.
- 4. CIRCUITS SHOWN ON DEMOLITION PLAN ARE FOR REFERENCE ONLY.

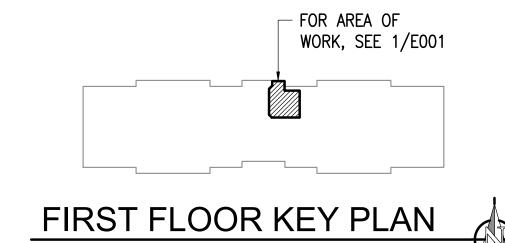
SHEET NOTES

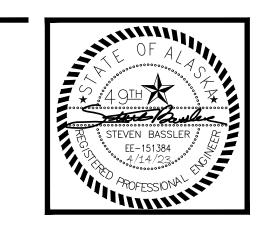
1. EXISTING 0.5"C IS RAN ON SURFACE OF WALL, REROUTE CONDUIT AS REQUIRED TO MOUNT NEW PANEL. ENSURE PROPER NEC WORKING CLEARANCE AND DEDICATED SPACE ARE FREE FROM OBSTRUCTION. DEDICATED SPACE EXTENDS 6FT ABOVE TOP OF PANEL.



MECHANICAL/ELEVATOR REMODEL PLAN

3/8" = 1'-0"





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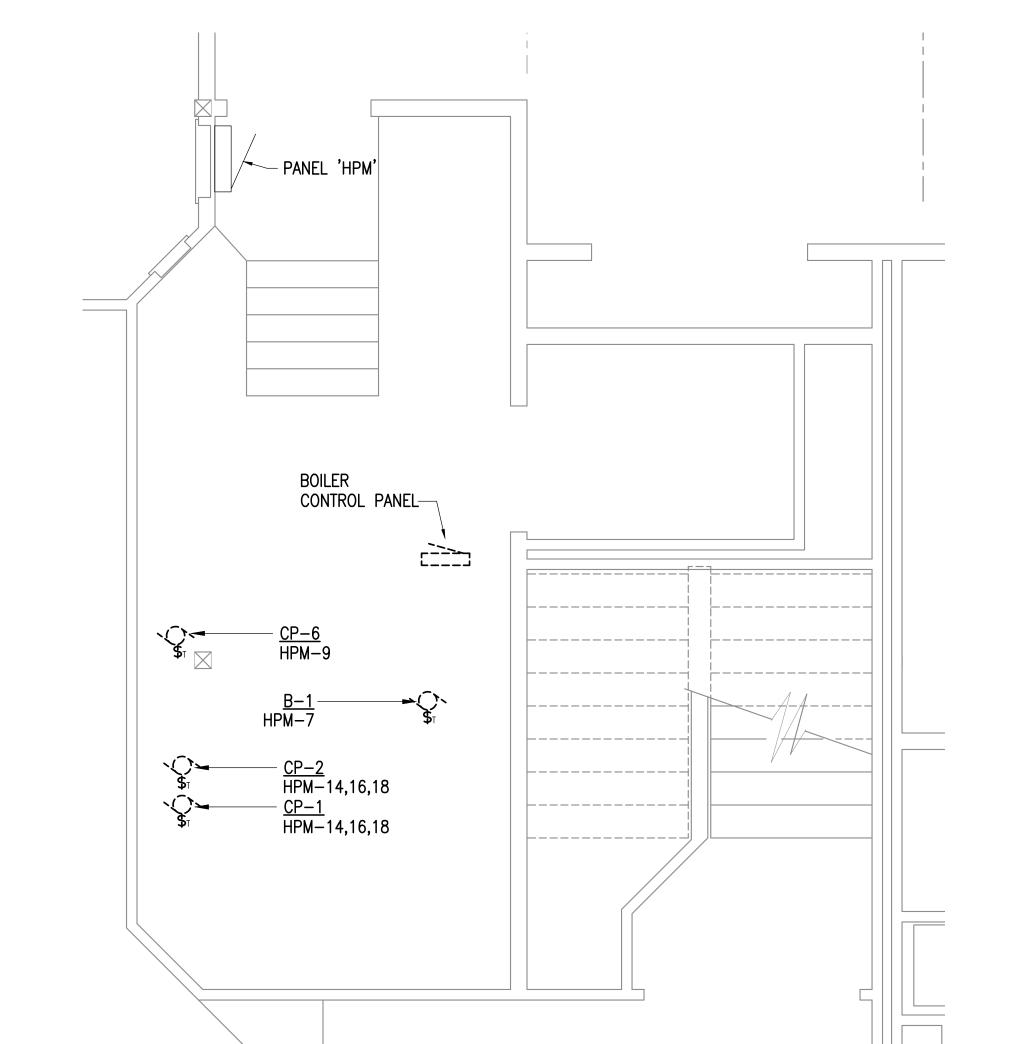
CHECKED BY: SB 4/14/2023 JOB NUMBER: M2229

BASE BID ELECTRICAL PLANS

DWG FILE:

E101

100%



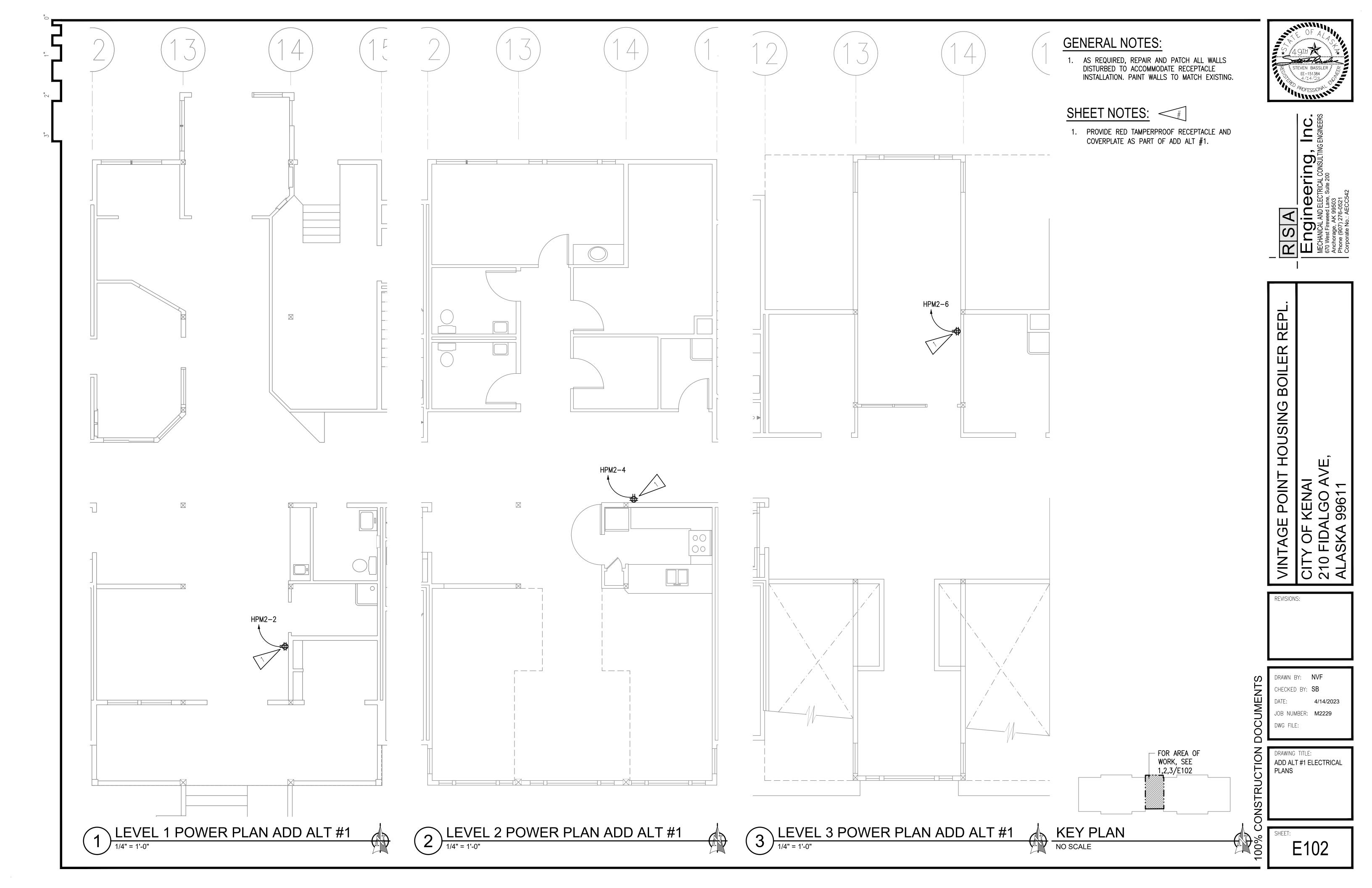
MECHANICAL/ELEVATOR DEMOLITION PLAN

3/8" = 1'-0"

DRAWINGS AND A NON-DESTRUCTIVE WALK THROUGH OF THE FACILITY. THERE IS NO WARRANTY OR GUARANTEE AS TO THE ACCURACY OF THE INFORMATION SHOWN HERE-IN. THE CONTRACTOR SHALL FIELD VERIFY ALL ITEMS SCHEDULED FOR DEMOLITION PRIOR TO START OF WORK.

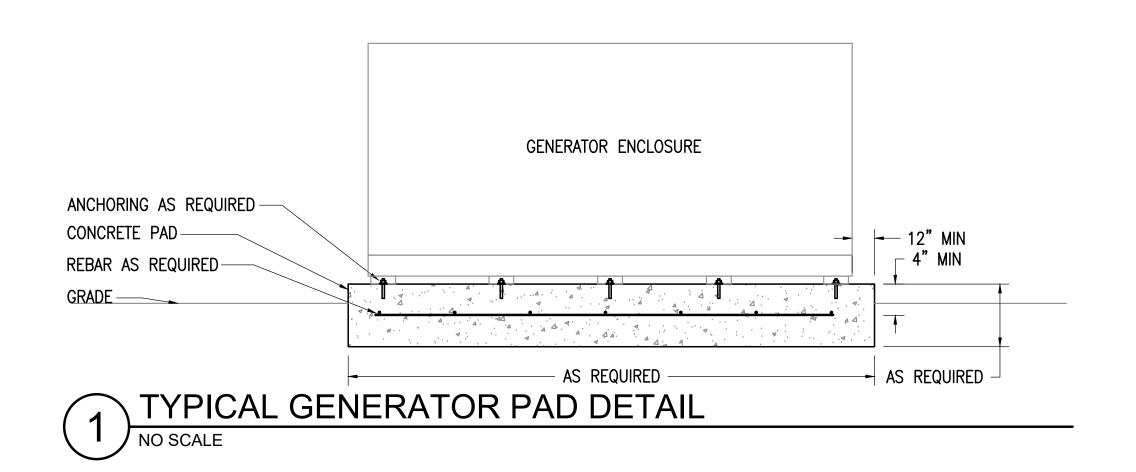
OF, OFF SITE, ALL UNWANTED MATERIALS.

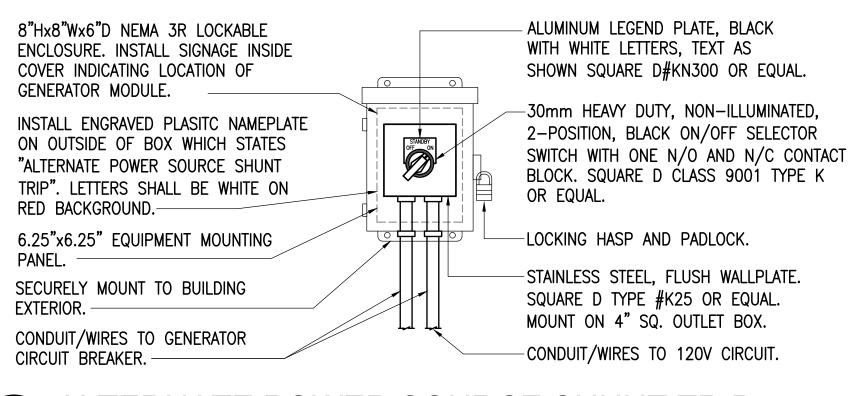
CONTRACTOR TO VERIFY.



(E)PANEL 'HPM'															
MFR/MODEL: SQUARE 'D' TYPE NQ					VOLTS: 120/208V,3PH,4W ENCL						SURE:	225	Α		
			VOLT-AMPS						MTG: SURFACE						
NOTE	POLE	AMPS	SERVICE	TYPE	A	\	В		(TYPE	SERVICE	AMPS	POLE	CIRC
a 1	1		ETR LOAD									ETR LOAD	20	1	2 a
a 3	1	-	ETR LOAD								•••••	ETR LOAD	20	1	4 a
a 5	1	20	ETR LOAD				1			***************************************		SPARE	20	1	6
a 7	1		ETR LOAD		***************************************							ETR LOAD	20	1	8 a
a 9	1	-	ETR LOAD									ETR LOAD	20	1	10 a
a 11	1		ETR LOAD							***************************************		ETR LOAD	20	1	12 a
a 13	1		ETR LOAD		***************************************	6180					MISC	(N)PANEL 'HPM2'	*	3	14 b
a 15	3	30	ETR LOAD					4072			MISC	λλλ	*	3	16 b
a 17	3	30	۸۸۸				3.			3208	MISC	۸۸۸	*	3	18 b
a 19	3	30	۸۸۸							\$		ETR LOAD	20	1	20 a
a 21	1	20	ETR LOAD		,						***************************************	ETR LOAD	20	1	22 a
a 23	1	20	ETR LOAD									ETR LOAD	20	1	24 a
a 25	1	20	ETR LOAD							,		ETR LOAD	20	3	26 a
a 27	1	20	ETR LOAD		,						***************************************	۸۸۸	20	3	28 a
a 29	1	20	ETR LOAD							***************************************		۸۸۸	20	3	30 a
a 31	1	20	ETR LOAD									ETR LOAD	20	1	32 a
a 33	1	20	ETR LOAD									ETR LOAD	20	1	34 a
a 35	1	20	ETR LOAD							VAAAAAAAAAAAAAAAAA		ETR LOAD	20	1	36 a
a 37	1	20	ETR LOAD									ETR LOAD	20	1	38 a
a 39	1	20	ETR LOAD							,		ETR LOAD	20	1	40 a
a 41	1	20	ETR LOAD							***************************************		ETR LOAD	20	1	42 a
			TOTAL V-A			15275		14367		10903		40,544	I VA		
			TOTAL AMPS			127		120		91		113	3 A		
			A.I.C. RATING: 10,000										_		
LTG				RECP	MOTR	LG.MT	MISC	KIT	HEAT	SPEC	TOTAL	AMPS			
CONNECTED LOAD IN KVA (THIS PANEL): 0.00				0.00	0.00	0.00	0.00	13.46	0.00	0.00	27.08	40.5 KVA		113	
			D LOAD IN KVA (BRANCH PANELS):									0.0 KVA			Α
		TOTA	L CONNECTED LOAD IN KVA:	0.00	0.00	0.00	0.00	13.46	0.00	0.00	27.08	40.5 KVA		113	
DANIE	LNO	TEO	DEMAND LOAD IN KVA:	0.00	0.00	0.00	0.00	13.46	0.00	0.00	27.08	40.5 KVA		113	Α
PANEL NOTES: a EXISTING TO REMAIN LOADS ARE TAKEN FROM ASBUILTS AND ACCOUNTED FOR UNDER 'SPEC' LOAD CALCUALTION b REMOVE EXISTING 15A, 3P BREEAKER AND REPLACE WITH NEW BREAKER AS SHOWN ON ONEL										PANEL OPTIONS: MAIN LUGS ONLY					
c d e															

MF	R/MC	DEL:	SQUARE 'D' TYPE NQ		VOLTS:	120/208	V,3PH,4	W		ENCLO	SURE:	NEMA 1		100	Α
							VOLT-	AMPS			MTG:	SURFACE			
SIRC FIRC	POLE	AMPS	SERVICE	TYPE	A	4	E	3		С	TYPE	SERVICE	AMPS	POLE	CIRC
1	1	20	BOILER B-1	HEAT	1920	360					RECP	1ST FLOOR STANDBY REC	20	1	2
3	1	20	BOILER B-2	HEAT			1920	360			RECP	2ND FLOOR STANDBY REC	20	1	4
5	2	15	BOILER PUMP BP-1	MOTR					280	360	RECP	3RD FLOOR STANDBY REC	20	1	6
7	2	15	۸۸	MOTR	280	500					MISC	GENERATOR CONTROLLER	20	1	8
9	2	15	BOILER PUMP BP-2	LG.MT			280	500			MISC	GENERATOR BATTARY CHARGER	20	1	10
11	2	15	۸۸	LG.MT			,		280	1456	MISC	GENERATOR HEATER	20	2	12
13	2	15	CIRCULATION PUMP CP-1	MOTR	832	1456				•	MISC	^^	20	2	14
15	2	15	۸۸	MOTR			832	180			RECP	GENERATOR RECP	20	1	16
17	2	15	CIRCULATION PUMP CP-2	MOTR					832			SPARE	20	1	18
19	2	15	۸۸	MOTR	832					,		SPARE	20	1	20
21	1	20	SPARE				***************************************					SPARE	20	1	22
23	1	20	SPARE				3				***************************************	SPARE	20	1	24
25	1	20	SPARE							\$		SPARE	20	1	26
27	1 1	20	SPARE				**************************************					SPARE	20	1	28
29	1	20	SPARE				1					SPARE	20	1	30
31	1	20	SPARE									SPARE	20	1	32
33	1	20	SPARE				***************************************					SPARE	20	1	34
35	1	20	SPARE							***************************************	***************************************	SPARE	20	1	36
37	1	20	SPARE							•		SPARE	20	1	38
39	1	20	SPARE				00000000					SPARE	20	1	40
41	1	20	SPARE									SPARE	20	1	42
		·	TOTAL V-A			6180		4072		3208		13,460	VA		
			TOTAL AMPS			52		34		27		37	Α		
			A.I.C. RATING: 10,000	"		,	•								
			,	LTG	RECP	MOTR	LG.MT	MISC	KIT	HEAT	SPEC	TOTAL	-	AMP:	S
C	ONNE	ECTE	D LOAD IN KVA (THIS PANEL):	0.00	1.26	4.45	0.14	3.91	0.00	3.84	0.00	13.5 KVA		37	Α
			D LOAD IN KVA (BRANCH PANELS):									0.0 KVA	***************************************	0	Α
		TOTA	L CONNECTED LOAD IN KVA:	0.00	1.26	4.45	0.14	3.91	0.00	3.84	0.00	13.5 KVA		37	Α
			DEMAND LOAD IN KVA:	0.00	1.26	4.45	0.14	3.91	0.00	4.80	0.00	14.6 KVA		40	Α
	EL NO RCUIT		ROVIDED UNDER ADD ALT #1								7	<u>OPTIONS:</u> LUGS ONLY			





2 ALTERNATE POWER SOURCE SHUNT TRIP
NO SCALE

EQUIPMENT SCCR SCHEDULE

FAULT CURRENT(AFC). EQUIPMENT AND ASSOCIATED CIRCUIT BREAKER AIC RATINGS MAY BE SATISFIED BY USING FULLY RATED EQUIPMENT OR MANUFACTURER TESTED COMBINATIONS FOR BRANCH CIRCUITS PER NEC 240.86(B) TO SERIES RATE FOR THE AVAILABLE SCA AT EQUIPMENT. MOTOR LOADS CAN NOT BE BETWEEN SERIES RATED COMBINATIONS AND MOTOR LOADS CANNOT EXCEED 1% OF AIC RATING PER NEC 240.86(C). ALL SERIES RATED EQUIPMENT TO BE CLEARLY LABELED & IDENTIFIED PER NEC 110.22(C).

CONTRACTOR TO VERIFY ACTUAL EQUIPMENT TO BE PROVIDED BY SERVING UTILITY PRIOR TO EQUIPMENT PROCUREMENT. ANY DECREASE OF TRANSFORMER %Z OR CONDUCTOR LENGTH, OR INCREASE IN TRANSFORMER KVA OR CABLE SIZES TO BE REPORTED TO CONTRACT OFFICER FOR RECALCULATION OF AVAILABLE FAULT CURRENT PRIOR TO PROCUREMENT OF EQUIPMENT.

PROVIDE FIELD MARKED CALCULATED AVAILABLE FAULT CURRENT AND DATE CALCULATED ON SERVICE DISCONNECT PER NEC 110.24 AND ON ALL SWITCH BOARDS, SWITCH GEAR, AND PANEL BOARDS PER NEC 110.21(B).

ASSUMED UTILITY SYSTEM CONFIGURATION FOR CALCUALTION ONLY **SERVICE TRANSFORMER**

KVA	% Z	SCA (PRI.)	SCA (SEC	:.)						
750	5.75	1,000,000	36,206							
ERVICE	FOR	FAULT CURRENT CALCU	ATIONS ONLY							
AMPS	SERVICE LATERAL									
600	2EA: (3)350 KCMIL, (1)1 AWG EGC									
EQUIPMENT AFC										
		16,141								
•	РΑ	5.457								

PANEL 'HPM2'

4,405

DRAWN BY: NVF CHECKED BY: SB JOB NUMBER: M2229 DWG FILE:

DRAWING TITLE: PANEL SCHEDULES **ELECTRICAL PLANS**

E201

HOUSING

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REVISIONS:

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4/14/2023