INVITATION TO BID

Fairbanks Pioneer Home Generator Upgrade AJF 18-07C

Bidders are invited to submit sealed bids, in single copy, to: Contractor to submit a bid to replace the existing interior generator with a new exterior generator which can support the entire building demand load, and updating the existing distribution system to accommodate the new generator. All work is to be done in accordance with the plans and specifications associated with this document.

A Pre-Bid walk through is scheduled for <u>January 22, 2018 @ 10:00am.</u> at the Fairbanks Pioneer Home located at 2221 Eagan Avenue, Fairbanks, Alaska – Bidders are strongly encouraged to attend. Please meet in the main lobby.

Project related questions or clarifications: Michael C. Dean, P.E., S.E., Project Manager at (907) 451-1657 or <u>mike.dean@alaska.gov</u>

Bids will be opened publicly at <u>2:00 pm</u> local time February 7. 2018 at 240 Main Street-Suite 502 Juneau Alaska 99801

Bids, modifications or withdrawals transmitted by mail must be received no later than 30 minutes prior to the scheduled time of bid opening.

James Woods at 240 Main Street - Suite 502 Juneau Alaska 99801 must receive hand-delivered bids, modifications or withdrawals prior to the scheduled time of bid opening.

Faxed bid modifications must be addressed to: DHSS/FMS/Facilities - ATTN: James Woods - Fax number: (907) 465-2607

The Engineer's Estimate: less than \$700,000

The Project completion date: September 28, 2018

Plans and Specifications may be printed by the Bidder from:

 the State of Alaska website (<u>www.state.ak.us</u>) Public Notices Online button, click on the More Public Notices button, Browse Active Public Notice button, then Health & Social Services, and Procurement

OR

 the Bidder may forward the project website location/address information to the print shop of their choice for printing – all associated printing costs are payable by the Bidder

Bidders are responsible for checking this website for addenda. Not acknowledging addenda at the time of bid will deem the Bidder non-responsive.

Issued: January 17, 2018

Fairbanks Pioneer Home

Generator Upgrade PROJECT NO. AJF 18-07C

TABLE OF CONTENTS

BIDDING AND CONTRACT REQUIREMENTS - STATE FUNDED PROJECTS

BIDDING REQUIREMENTS

00020 - Invitation for Bids - Form 06D-7 (7/03) 00100 - Information to Bidders - 06D-3 00101 - Supplementary Information to Bidders 00120 - Required Documents, 06D-4 (8/01) 00145 - Veterans Preference Affidavit, 06D-17 (April 2012) 00310 - Proposal and Non-Collusion Affidavit - Form 06D-9 (7/03) 00311 - Alaska Products Preference Worksheet 00312 - Bid Schedule 00410 - Bid Security Form 06D-14 (8/01) 00420 - Bid Modification - Form 06D-16 (8/01) 00430 - Subcontractor List - Form 06D-5 (8/01)

CONTRACT FORMS

00510 - Construction Contract - Form 06D-10a (8/01)

- 00610 Performance Bond Form 06D-13 (8/01)
- 00620 Payment Bond Form 06D-12 (8/01)
- 00670 Contractor's Questionnaire Form 06D-8 (8/01)

PROVISIONS OF THE CONTRACT

- 00700 General Conditions of the Construction Contract for Buildings
- 00800 Supplementary General Conditions
- 00830 Laborers' and Mechanics' Minimum Rates of Pay

00850 - Drawing Index

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

- 01 10 00 Summary of Work
- 01 12 19 Subcontractor Certification of Subcontracts
- 01 12 19 Contractor's Certification Form
- 01 26 00 Contract Modification Procedures
- 01 29 00 Payment Procedures
- 01 30 00 Administrative Requirements
- 01 40 00 Quality Requirements
- 01 42 19 Reference Standards
- 01 50 00 Temporary Facilities and Controls
- 01 60 00 Product Requirements
- 01 73 00 Cutting and Patching
- 01 77 00 Closeout Procedures
- 01 78 00 Closeout Submittals

Fairbanks Pioneer Home Generator Upgrade PROJECT NO. AJF 18-07C

DIVISION 23 – MECHANICAL

- 23 05 00 Common Work Results for HVAC
- 23 09 23 Direct Digital Control System for HVAC
- 23 11 11 Facility Fuel-Oil Piping

DIVISION 26 - ELECTRICAL

26 01 26	Maintenance Testing of Electrical Systems
26 05 00	Common Work Results for Electrical
26 05 05	Selective Demolition for Electrical
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 33	Raceway and Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 05 83	Wiring Connections
26 24 16	Panelboards
26 27 26	Wiring Devices
26 32 00	Packaged Generator Assemblies
~~ ~~ ~~	

26 36 00 Transfer Switches

DRAWINGS

(Bound Separately)

Drawing	Description
M1.0	Mechanical Demolition, Remodel, and Legends
E0.1	Electrical Legend, Load Calculations, and Panel Schedule
E0.2	Electrical One-Line Diagrams
E1.1	Electrical Demolition Plan
E2.1	Electrical Remodel Plan
E2.2	Enlarged Electrical Plans
E3.1	Electrical Details

End of Table of Contents

SE of AL		STATE OF ALASKA DF HEALTH & SOCIAL SERVICES			
STATISTICS HIS	DEFRICTMENT				
	INVITATION TO BID				
Fitters of Health and Social State	tor	Construction Contract			
		Date January 17, 2018			
FAIRBAN	KS PIONEER HOME G	ENERATOR UPGRADE, PROJECT AJF 18-07C			
Location of Project:	Pro Fairbanks, Alaska	oject Name and Number			
Contracting Officer:	Michael Frawley				
Issuing Office:		vices, Office of the Commissioner, Finance & Management Services			
Description of Work:	State Funde	ed [x] Federal Aid []			
		interior generator with a new exterior generator which can support the sting distribution system to accommodate the new generator.			
All work shall be comp Interim Completion da Bidders are invited	The Engineer's Estimate is: Less than \$700,000 All work shall be completed by September 28, 2018 Interim Completion dates, if applicable, will be shown in the Special Provisions. Bidders are invited to submit sealed bids, in single copy, for furnishing all labor, equipment, and materials and for				
	x for the project described a 502 Juneau, Alaska 99801 on	bove. Bids will be opened publicly at <u>2:00 pm</u> local time, at <u>240</u> <u>February 7, 2018</u> .			
	SU	BMISSION OF BIDS			
		IDRAWALS MUST BE RECEIVED PRIOR TO BID OPENING. BIDS SHALL UST BE IN A SEALED ENVELOPE MARKED AS FOLLOWS:			
Bid for Project:		ATTN: James Woods			
AJF 18-07C Fairbanks Pione Generator Upgra		State of Alaska Department of Health and Social Services Finance & Management Services, Facilities Office 240 Main Street - Suite 502 Juneau, AK 99801			
<u>minutes</u> prior to the so <u>Main Street – Suite 5</u>	cheduled time of bid opening. I	I must be received in the above specified post office box no later than $\underline{30}$ Hand-delivered bids, amendments or withdrawals must be received at $\underline{240}$ or to the scheduled time of bid opening. Faxed bid amendments must be 2607.			
	n the bid schedule shall be inclu	nt of 5% of the amount bid. (Alternate bid items as well as supplemental uded as part of the total amount bid when determining the amount of bid			
Invitation, Disadvanta	aged Business Enterprises (DB	ill affirmatively insure that in any contract entered into pursuant to this Es) will be afforded full opportunity to submit bids and will not be tional origin, or sex in consideration for an award.			

NOTICE TO BIDDERS

Bidders are hereby notified that data to assist in preparing bids is available as follows:

Plans and Specifications may be printed by the Bidder from:

- the State of Alaska website under Public Notices On-line
- OR
 - the Bidder may forward the project website location/address information to the print shop of their choice for printing all associated printing costs are payable by the Bidder

All questions relating to technical aspects of the project should be directed to the following. Bidders requesting assistance in viewing the project must make arrangements at least 48 hours in advance with:

Project manager: Michael C. Dean, P.E., S.E., ADOT&PF, SWPF

Cell: (907) 388-5165_

Phone: (907) 451-1657

Email: mike.dean@alaska.gov

All questions concerning bidding procedures should be directed to: ATTN: James Woods State of Alaska Department of Health and Social Services Finance & Management Services, Facilities Office 240 Main Street - Suite 502 Juneau, AK 99811

Other Information:

Alaska Veterans Preference

- To qualify for the Veterans Preference (per AS 36.30.175), the bidder must:
 - 1. Qualify for the Alaska Bidder's Preference
 - 2. Add value by actually performing the services or have prior experience in selling the supplies
 - 3. Qualify as an Alaska Veteran & Complete/sign Alaska Veterans Affidavit (06D-17, dated 4/12)
 - 4. The value of the preference cannot exceed \$5,000.

INFORMATION TO BIDDERS

The Department is concerned over the manner in which bids are submitted. Bidders are requested to study and follow the bid assembly instructions as to the method and form for submitting bids so there will be no reason to reject a bid.

EXAMINATION OF CONTRACT REQUIREMENTS

Bidders are expected to examine carefully the plans, specifications and all other documents incorporated in the contract to determine the requirements thereof before preparing bids.

Any explanation desired by bidders regarding the meaning or interpretation of drawings and specifications must be requested in writing and with sufficient time allowed for a reply to reach them before the submission of their bids. Oral explanations or instructions given before the award of the contract will not be binding. Any interpretation made will be in the form of an addendum to the specifications or drawings and will be furnished to all bidders and its receipt by the bidder shall be acknowledged.

CONDITIONS AT SITE OF WORK

Bidders are expected to visit the site to ascertain pertinent local conditions such as the location, accessibility and character of the site, labor conditions, the character and extent of the existing work within or adjacent thereto, and any other work being performed thereon.

PREPARATION OF BIDS

- (a) Bids shall be submitted on the forms furnished, and must be manually signed in ink. If erasures or other changes appear on the forms, each such erasure or change must be initialed by the person signing the proposal.
- (b) The bid schedule will provide for quotation of a price or prices for one or more pay items which may include unit price or lump sum items and alternative, optional or supplemental price schedules or a combination thereof which will result in a total bid amount for the proposed construction.

Where required on the bid form, bidders must quote on all items and THEY ARE WARNED that failure to do so will disqualify them. When quotations on all items are not required, bidders should insert the words "no bid" in the space provided for any item not requiring a quotation and for which no quotation is made.

(c) The bidder shall specify the price or prices bid in figures. On unit price contracts the bidder shall also show the products of the respective unit prices and quantities written in figures in the column provided for the purpose and the total amount of the proposal obtained by adding the amounts of the several items. All the figures shall be in ink or typed.

- (d) Neither conditional nor alternative bids will be considered unless called for.
- (e) Unless specifically called for, telegraphic or telefacsimile bids will not be considered.
 - (f) Bid Schedule form should be enclosed in a separate sealed envelope and enclosed with all other bidding forms required at the opening.

BID SECURITY

All bids shall be accompanied by a bid security in the form of an acceptable Bid Bond (Form 06D-14), or a certified check, cashier's check or money order made payable to the State of Alaska. The amount of the bid security is specified on the Invitation to Bid.

Bid Bonds must be accompanied by a legible Power of Attorney.

If the bidder fails to furnish an acceptable bid security with the bid, the bid shall be rejected as nonresponsive. Telegraphic notification of execution of Bid Bond does not meet the requirement of bid security accompanying the bid. An individual surety will not be accepted as a bid security.

The bid securities of the two lowest bidders will be held by the Department until the Contract has been executed, after which such bid securities will be returned. All other bid securities will be returned as soon as practicable. If all bids are rejected, all bid securities will be returned as soon as practicable.

BIDDERS QUALIFICATIONS

Before a bid is considered for award, the bidder may be requested by the Department to submit a statement of facts, in detail, as to his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the contemplated work.

SUBMISSION OF BIDS

Bids must be submitted as directed on the Invitation for Bids. Do not include in the envelope any bids for other work.

ADDENDA REQUIREMENTS

The bid documents provide for acknowledgement individually of all addenda to the drawings and/or specifications on the signature page of the Proposal. All addenda shall be acknowledged on the Proposal or by telegram prior to the scheduled time of bid opening. If no addenda are received by the bidder, the word "None" should be shown as specified.

Every effort will be made by the Department to insure that Contractors receive all addenda when issued. Addenda will be issued to the individual or company to whom bidding documents were issued. Addenda may be issued by any reasonable method such as hand delivery, mail, telefacsimile, telegraph, email, internet download, courier and in special circumstances by phone. Addenda will be issued to the address, telefacsimile number or phone number as stated on the planholder's list unless picked up in person or included with the bid documents. It is the bidder's responsibility to insure that he has received all addenda affecting the Invitation for Bids. No claim or protest will be allowed based on the bidder's allegation that he did not receive all of the addenda

for an Invitation for Bids. The Department is not responsible for issuing addenda to non-registered bidders.

WITHDRAWAL OR REVISION OF BIDS

A bidder may withdraw or revise a bid after it has been deposited with the Department, provided that the request for such withdrawal or revision is received by the designated office, in writing, by telegram, or by telefacsimile, before the time set for opening of bids.

Telegraphic or telefacsimile modifications shall include both the modification of the unit bid price and the total modification of each item modified, but shall not reveal the amount of the total original or revised bids. Form 06D-16 shall be used to submit such modifications.

RECEIPT AND OPENING OF BIDS

- (a) All bids, including any amendment or withdrawal must be received by the Department prior to the scheduled time of bid opening. Any bid, amendment, or withdrawal that has not been actually received by the Department prior to the time of the scheduled bid opening will not be considered.
- (b) No responsibility will be attached to any officer or employee of the Department for the premature opening of, or failure to open, a bid improperly addressed or identified.
- (c) The Department reserves the right to waive any technicality in bids received when such waiver is in the interest of the State.

BIDDERS PRESENT

At the time fixed for bid opening, bids will be publicly opened and read for the information of bidders and others properly interested, who may be present either in person or by representative. The amount of the bid and the name of the bidder shall be compiled and distributed as soon as possible after bid opening. Bids are not open for public inspection until after the Notice of Intent to Award is issued.

BIDDERS INTERESTED IN MORE THAN ONE BID

If more than one bid is offered by any one party, by or in the name of his or their clerk or partner, all such bids will be rejected. A party who has quoted prices to a bidder is not thereby disqualified from quoting prices to other bidders or from submitting a bid directly for the work.

REJECTION OF BIDS

The Department reserves the right to reject any and all bids when such rejection is in the best interest of the State; to reject the bid of a bidder who has previously failed to perform properly, or complete on time, contracts of a similar nature; to reject the bid of a bidder who is not, in the opinion of the Contracting Officer, in a position to perform the contract; and to reject a bid as non-responsive where the bidder fails to furnish the required documents, fails to complete required documents in the manner directed, or makes unauthorized alterations to the bid documents.

AWARD OF CONTRACT

- (a) The letter of award, if the contract is to be awarded, will be issued to the lowest responsible and responsive bidder as soon as practical and usually within 40 calendar days after opening of proposals.
- (b) The successful bidder will be notified of the Department's intent to award the contract and requested to execute certain documents, including the contract form and bonds.
- (c) The contract will be awarded to the successful bidder following receipt by the Department of all required documents, properly executed, within the time specified in the intent to award. Failure to enter into a contract within the specified time shall be grounds for forfeiture of the bid security and consideration of the second low bidder for award.

SUPPLEMENTARY INFORMATION TO BIDDERS

This document modifies or adds to the provisions of Department of Health & Social Services form 06D-3, INFORMATION TO BIDDERS.

Following subparagraph (c) under subject area "PREPARATION OF BIDS", add the following subparagraph:

"(C-1) When provided within the supplements to the bid schedule the Bidder shall specify those Alaska bidder and product preferences applicable to their bid. All entries made by the Bidder and designating applicable preferences must conform to the requirements of AS 36.30 and the instructions on the forms to warrant consideration."

Following subject area "REJECTION OF BIDS", add the following subject area:

"CONSIDERATION OF PROPOSALS

After the Proposals are opened and read, they will be compared on the basis identified on the bid schedule and the apparent low Bidder announced. The apparent low Bidder shall, within 5 working days following identification as the apparent low Bidder, submit a list of all firms with which the prime CONTRACTOR intends to execute subcontracts for the performance of the Contract. The list shall include the name, business address, Alaska business license number and contractor's registration number of each proposed Subcontractor.

Upon confirmation of the contents of the proposal the low Bidder will be identified by the DEPARTMENT by telephone and in writing. If the low Bidder differs from the apparent low Bidder then the requirements for Subcontractor listing, as noted above, shall become effective upon the low Bidder at the time of identification.

If a Bidder fails to list a Subcontractor or lists more than one Subcontractor for the same portion of Work and the value of that Work is in excess of one-half of one percent of the total bid, the Bidder agrees that it shall be considered to have agreed to perform that portion of Work without the use of a Subcontractor and to have represented that the Bidder is qualified to perform the Work.

A Bidder who attempts to circumvent the requirements of this section by listing as a Subcontractor another contractor who, in turn, sublets the majority of the Work required under the Contract, violates this section.

If a Contract is awarded to a Bidder who violates this section, the Bidder agrees that the Contracting Officer may:

- (1) cancel the Contract without any damages accruing to the State; or
- (2) after notice and a hearing, assess a penalty on the Bidder in an amount that does not exceed 10 percent of the value of the Subcontract at issue.

A Bidder may replace a listed Subcontractor who:

- (1) fails to comply with AS 08.18;
- (2) files for bankruptcy or becomes insolvent;
- (3) fails to execute a contract with the Bidder involving performance of the Work for which the Subcontractor was listed and the Bidder acted in good faith;
- (4) fails to obtain bonding;
- (5) fails to obtain insurance acceptable to the State;
- (6) fails to perform the Contract with the Bidder involving Work for which the Subcontractor was listed;
- (7) must be substituted in order for the prime CONTRACTOR to satisfy required State and Federal affirmative action requirements;
- (8) refuses to agree or abide with the bidder's labor agreement; or
- (9) is determined by the Contracting Officer to be non-responsive."

Modify subject area "AWARD OF CONTRACT" as follows:

Subparagraph (a) substitute the word "generally" for the phrase "as soon as practical and"

Subparagraph (b) delete and substitute the following:

"All Bidders will be notified of the DEPARTMENT's intent to Award the Contract and the successful Bidder will be requested to execute certain documents, including the Contract form and bonds."



REQUIRED DOCUMENTS

State Funded Contracts

Fairbanks Pioneer Home Generator Upgrade AJF 18-07C

REQUIRED FOR BID. Bids will not be considered if the following documents are not completely filled out and submitted at the time of bidding:

- **1. Bid Form (Form 06D-9)**
- 2. Bid Schedule
- 3. Bid Bond (Form 06D-14)
- 4. Any bid revisions must be submitted by the bidder prior to bid opening on the following form:

Bid Modification (Form 06D-16)

REQUIRED AFTER NOTICE OF APPARENT LOW BIDDER. The apparent low bidder is required to complete and submit the following document within 5 working days after receipt of written notification:

1. Subcontractor List (Form 06D-5)

REQUIRED FOR AWARD. In order to be awarded the contract, the successful bidder must completely fill out and submit the following documents within the time specified in the intent to award letter:

- 1. Contract (Form 06D-10A)
- 2. DD Form 214 or NGB Form 22 (if claiming Alaska Veterans Preference under AS 36.30.175(d))
- 3. Payment Bond (Form 06D-12)
- 4. Performance Bond (Form 06D-13)
- 5. Contractor's Questionnaire (Form 06D-8)
- 6. Contractor's Certification of Subcontractors (Form 05)
- 7. **Certificate of Insurance** (from carrier)
- 8. Dept. of Labor Notice of Work Form
- 9. W-9



ALASKA VETERAN'S PREFERENCE AFFIDAVIT

In response to the Invitation to Bid for: Fairbanks Pioneer Home Project Name and Number: Generator Upgrade, Project AJF 18-07C,

I certify under penalty of perjury that ____

(Name) qualifies for the Alaska Veteran's Preference under the following conditions:

- (a) If a bidder qualifies under AS 36.30.170(b) as an Alaska bidder and is a qualifying entity, a five percent bid preference shall be applied to the bid price (preference may not exceed \$5,000). In this subsection, "qualifying entity" means a:
 - (1) Sole proprietorship owned by an Alaska Veteran;
 - (2) Partnership under AS 32.06 or AS 32.11 if a majority of the members are Alaska Veteran's;
 - (3) Limited Liability Company organized under AS 10.50 if a majority of the individuals are Alaska Veterans.
- (b) To qualify for a preference under this section, a bidder must add value by the bidder itself actually performing, controlling, managing and supervising a significant part of the services provided, or the bidder must have sold supplies of the general nature solicited to other state agencies, governments, or the general public.
- (c) In this section, "Alaska Veteran" means an individual who is a:
 - (1) Resident of this state; and
 - (2) Veteran; means an individual who:

(A) Served in the:

- (i) Armed Forces of the United States, including a reserve unit of the United States armed forces; or
- (ii) Alaska Territorial Guard, the Alaska Army National Guard, the Alaska Air National Guard, or the Alaska Naval Militia; and
- (B) Was separated from the service under a condition that was not dishonorable.

Authorized Signature

Printed Name

Date

Form 06D-17 (April 2012)



BID FORM

for

Fairbanks Pioneer Home Generator Upgrade #AJF 18-07C

Project Name and Number

Bу

Company Name

Company Address (Street or PO Box, City, State, Zip)

To the CONTRACTING OFFICER, DEPARTMENT OF HEALTH & SOCIAL SERVICES

In compliance with your Invitation for Bids dated_<u>January 17, 2018</u>, the Undersigned proposes to furnish and deliver all the materials and do all the work and labor required in the construction of the above-referenced Project, located at or near <u>Fairbanks</u>, Alaska, according to the plans and specifications and for the amount and prices named herein as indicated on the Bid Schedule consisting of _____ sheet(s), which is made a part of this Bid.

The Undersigned declares that he has carefully examined the contract requirements and that he has made a personal examination of the site of the work; that he understands that the quantities, where such are specified in the Bid Schedule or on the plans for this project, are approximate only and subject to increase or decrease, and that he is willing to perform increased or decreased quantities of work at unit prices bid under the conditions set forth in the Contract Documents.

The Undersigned hereby agrees to execute the said contract and bonds within fifteen calendar days, or such further time as may be allowed in writing by the Contracting Officer, after receiving notification of the acceptance of this bid, and it is hereby mutually understood and agreed that in case the Undersigned does not, the accompanying bid guarantee shall be forfeited to the State of Alaska, Department of Health & Social Services as liquidated damages, and the said Contracting Officer may proceed to award the contract to others.

The Undersigned agrees to commence the work within 10 calendar days and to complete the work by <u>September 28, 2018</u>, unless extended in writing by the Contracting Officer.

The Undersigned proposes to furnish Payment Bond in the amount of **50%** and Performance Bond in the amount of **50%** (of the contract), as surety conditioned for the full, complete and faithful performance of this contract.

Addenda Number	Date	Addenda	Date	Addenda	Date
Humbon	Issued	Number	Issued	Number	Issued
		NON-COLLU	SION AFFIDAVI	r	
					e, nor the firm, association ment, participated in
				connection with this	
	2				
	as read the forego	ing proposal and l	nereby agrees to	the conditions state	d therein by affixing
nature below:					
		Signature	of Authorized Company	y Representative	
		Typed or F	Printed Name and Title		
		Typed or F	Printed Name and Title		
		Typed or F Phone Nur			
				Fax Number	
			nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		
		Phone Nur	nber		

ALASKA PRODUCTS PREFERENCE WORKSHEET

(See Reverse Side for Instructions)

Project Name and No: Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C

Bid Phase:_____

Contractor:_____

PRODUCT	MANUFACTURER	CLASS & PREFERENCE PERCENTAGE	TOTAL DECLARED VALUE	REDUCTION AMOUNT
		<u> </u>		
TOTAL				

INSTRUCTIONS FOR ALASKA PRODUCTS PREFERENCE WORKSHEET

Special Note:

All procurements, except those funded form Federal sources, shall contact provisions for the preference of Alaska products. The products listed by the Bidder on this worksheet have been selected for the referenced project from the "Alaska Product Preference List" which was in force 30 days prior tho the advertisement date of this contract. Bidders may obtain a copy of the appropriate listing "Alaska Preference List" by contacting their local DCED office or by writing: Dept. of Commerce & Economic Development, Alaska Products Preference Listing, P.O. Box D, Juneau, AK 99811.

BIDDERS INSTRUCTIONS:

A. **General**. The Contracting Agency may request documentation to support entries made on this form. False presentations may be subject to AS 36.30.687. All Bidder's entries must conform to the requirements covering bid preparations in general. Discrepancies in price extensions shall be resolved by multiplying the declared total value times the preference percentage and adjusting any resulting computation accordingly.

B. Form Completion - BASIC BIDS.

(1) Enter project number and name, the words "Basic Bid" and the CONTRACTOR'S name in the heading of each page as provided.

(2) The Bidder shall compare those candidate products appearing on the preference listing (see Special Notice comments above) against the requirements of the technical specifications appearing in the contract documents. If the Bidder determines that a candidate product can suitably meet the contract requirements, then that product may be included in the worksheet as follows.

(3) For each suitable product submitted under the "Basic Bid" enter:

- ! the product name, generic description and its corresponding technical specification section number under the heading "PRODUCT",
- ! the company name of the Alaska producer under the heading "MANUFACTURER", and,
- ! the product class (I, II, or III) and preference percentage (3, 5, or 7%, respectively) under the "CLASS/%" heading.

(4) For each product appearing on the list and to be utilized by the CONTRACTOR enter:

- ! under the heading "TOTAL DECLARED VALUE" the manufacturer's quoted price of the product, (caution: this value is to be the manufacturer's quoted price at the place of origin and shall not include costs for freight, handling or miscellaneous charges of incorporating the product into the Work), and
- ! the resulting preference--ie.: the preference percentage times the total declared value amount -- under the heading "REDUCTION AMOUNT".

(5) Continue for all "suitable" basic bid products. If the listing exceeds one page enter the words "Page #___SUB" in front of the word "TOTAL" and on the first entry line of the following page enter "SUBTOTAL OF REDUCTION AMOUNT FROM PREVIOUS PAGE".

(6) On the final page of the listing enter "BASIC BID PREFERENCE GRAND" immediately before the word "TOTAL".

(7) Total the entries in the "REDUCTION AMOUNT" column for each page by commencing at the first entry for that page. If a continuation page exists, ensure that the subtotal from the previous page is computed into the running total. Number pages as appropriate.

(8) Compute a Grand Total for the Basic Bid Preference. Enter this amount on the final page of the worksheet and at line or column "C" on the Bid Schedule or Bid Schedule Summary Sheet as appropriate. Submit worksheet(s) with Bid Schedule Summary Sheet.

C. Forms Completion - ALTERNATE BIDS.

(1) Enter project number and name, the words "ALTERNATE BID #_____", and CONTRACTOR'S name in the heading of each page as provided.

(2) On the first entry line enter "ADDITIONAL ALASKA PRODUCTS FOR ALTERNATE BID

#_____", and repeat procedures 2 through 5 under part B of these Bidder's instructions except that references to "Basic Bid" shall be replaced with the words "Alternate Bid #_____."

(3) Following the listing of all additional Alaska products enter the words "ADDITIONAL PRODUCTS PREFERENCE FOR ALTERNATE BID #_____--SUBTOTAL" and enter a subtotal amount for all additional products as listed. Subtotal amount to be determined by adding all <u>additional product</u> entries in the "REDUCTION AMOUNT" column.

(4) Skip three lines and enter "LESS THE FOLLOWING NON-APPLICABLE ALASKA PRODUCTS".

(5) Beginning on the next line enter the product name and manufacturer of each Alaska Product appearing on the "Basic Bid" listing which would be deleted or reduced from the Project should the "Alternate Bid" be selected. Details of entry need only be sufficient to clearly reference the subject product. (ie. "Prehung Doors by Alaska Door Co. in lieu of "Prehung Solid Core Wood Door, model "Super Door", Section 08210, by Alaska Door Co., Anchorage.) Products being reduced shall specify the amount of the reduction. Should no products require deletion enter "None". When a product is listed as a "NON-APPLICABLE ALASKA PRODUCT" for this alternate bid and if under the basic bid the Bidder received a preference on his basic bid as a result of that product, then the applicable entries under the basic bid listing "TOTAL DECLARED VALUE" and "REDUCTION AMOUNT" (for each product and from the basic bid listing) shall also be entered into the corresponding headings of this form. Where only a portion of the product has been deleted, the entry (which will differ from those on the basic bid listing) may be "pro-rated" or as otherwise substantiated.

(6) Following the listing of all non-applicable Alaska products enter the words "NON-APPLICABLE PRODUCTS PREFERENCE FORM BASIC BID --SUBTOTAL" and enter a subtotal amount for all non-applicable products al listed. Subtotal amount to be determined by adding all <u>non-applicable</u> entries in the "REDUCTION AMOUNT" column.

(7) At the bottom of the final page enter the words "ALTERNATE BID #____PREFERENCE GRAND" immediately before the word "TOTAL".

(8) Compute a Grand Total for the Alternate Bid Preference (for Alternate #____) by subtracting the nonapplicable product preference subtotal from the additional product preference subtotal. Enter on the final page as provided and at the corresponding line in column "C" on the Bid Schedule Summary Sheet. Submit worksheet(s) with the Bid Schedule Summary Sheet.

(9) A separate listing for each alternate bid is required.

BID SCHEDULE

Project: Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C

Bidders Please Note: Before preparing this bid schedule, read carefully, "Information to Bidders", 'Supplementary Information to Bidders", and the following:

The Bidder shall insert a fixed price in figures opposite each pay item that appears in the bid schedule to furnish all labor, material, equipment, supervision, and provide all work for each item listed. No price is to be entered or tendered for any item not appearing in the bid schedule. Conditioned or qualified bids will be considered non-responsive.

PAY ITEM	1 DESCRIPTION OF PAY ITEM	TOTAL BID PRICE, IN FIGURES
1. BASIC B	All work described in the Specifications and Construction Documents for the Project # AJF 18-07C	
a.	Lump Sum Total Basic Bid	\$
b.	Alaska Bidder's Preference - (5% of Basic Bid)	\$
c.	Alaska Veterans Preference - 5% of Basic Bid (May not exceed \$5,000)	\$
d.	Alaska Products Preference - (Attach worksheet(s))	\$
e.	Adjusted Basic Bid: $(a - b - c - d)$	\$

Contractor's Name (Printed)

Alaska Contractor's Registration #

Alaska Business License #

Expires

Expires



BID BOND

For

Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C Project Name and Number				
DATE BOND EXECUTED:				
PRINCIPAL (Legal name and business address): TYP		TYPE OF ORGANIZATION:		
		[] Individual[] Partnership[] Joint Venture[] Corporation		
		STATE OF INCORPORATION:		
SURETY(IES) (Name and busine	ss address):			
A.	В.	С.		
PENAL SUM OF BOND:	I	DATE OF BID:		

We, the PRINCIPAL and SURETY above named, are held and firmly bound to the State (State of Alaska), in the penal sum of the amount stated above, for the payment of which sum will be made, we bind ourselves and our legal representatives and successors, jointly and severally, by this instrument.

THE CONDITION OF THE FOREGOING OBLIGATION is that the Principal has submitted the accompanying bid in writing, date as shown above, on above-referenced Project in accordance with contract documents filed in the office of the Contracting Officer, and under the Invitation for Bids therefore, and is required to furnish a bond in the amount stated above.

If the Principal's bid is accepted and he is offered the proposed contract for award, and if the Principal fails to enter into the contract, then the obligation to the State created by this bond shall be in full force and effect.

If the Principal enters into the contract, then the foregoing obligation is null and void.

PRINCIPAL

Signature(s)	1.	2.	3.
Name(s) & Title(s) (Typed)	1.	2.	3.
			Corporate Seal
See Instructions on Reverse			

Surety A	Name of Corporation		State of Incorporation	Liability Limit \$
Signature(s)	1.	2.		Corporate
Name(s) & Titles (Typed)	1.	2.		Seal
Surety B	Name of Corporation		State of Incorporation	Liability Limit \$
Signature(s)	1.	2.		Corporate
Name(s) & Titles (Typed)	1.	2.		Seal
Surety C	Name of Corporation		State of Incorporation	Liability Limit \$
Signature(s)	1.	2.		Corporate
Name(s) & Titles	1.	2.		Seal

INSTRUCTIONS

- 1. This form shall be used whenever a bid bond is submitted.
- 2. Insert the full legal name and business address of the Principal in the space designated. If the Principal is a partnership or joint venture, the names of all principal parties must be included (e.g., "Smith Construction, Inc. and Jones Contracting, Inc. DBA Smith/Jones Builders, a joint venture"). If the Principal is a corporation, the name of the state in which incorporated shall be inserted in the space provided.
- 3. Insert the full legal name and business address of the Surety in the space designated. The Surety on the bond may be any corporation or partnership authorized to do business in Alaska as an insurer under AS 21.09. Individual sureties will not be accepted.
- 4. The penal amount of the bond may be shown either as an amount (in words and figures) or as a percent of the contract bid price (a not-to-exceed amount may be included).
- 5. The scheduled bid opening date shall be entered in the space marked Date of Bid.
- 6. The bond shall be executed by authorized representatives of the Principal and Surety. Corporations executing the bond shall also affix their corporate seal.
- 7. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.
- 8. The states of incorporation and the limits of liability of each surety shall be indicated in the spaces provided.
- 9. The date that bond is executed must not be later than the bid opening date.

(Typed)



BID MODIFICATION

Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C

Project Name and Number

Modification Number: _

Note: All revisions shall be made to the unadjusted bid amount(s). Changes to the adjusted bid amounts <u>will be computed by the Department</u>.

PAY ITEM NO.	PAY ITEM DESCRIPTION	REVISION TO UNIT BID PRICE +/-	REVISION TO BID AMOUNT +/-
		N/A	
TOTAL REVISION: \$			

Name of Bidding Firm

Responsible Party Signature

Date

This form may be duplicated if additional pages are needed.



SUBCONTRACTOR LIST

Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C Project Name and Number

The apparent low bidder shall complete this form and submit it so as to be received by the Contracting Officer prior to the close of business on the fifth working day after receipt of written notice from the Department.

Failure to submit this form with all required information by the due date will result in the bidder being declared non-responsive and may result in the forfeiture of the Bid Security.

Scope of work must be clearly defined. If an item of work is to be performed by more than one firm, indicate the portion or percent of work to be done by each.

Check as applicable: All work on the below-referenced project will be accomplished without subcontracts greater than ½ of 1% of the contract amount. OR Subcontractor List is as follows: 				
FIRM NAME, ADDRESS, & PHONE No.	AK BUSINESS LICENSE No. & CONTRACTOR'S REGISTRATION No.	SCOPE OF WORK TO BE PERFORMED		
CONTINUE SUBCONTRACTOR INFORMATION ON REVERSE I hereby certify the listed Alaska Business licenses and Contractor's registrations were valid at the time bids were opened for this project.				
Signature of Authorized Company Representation	tive Title			
Company Name	Company Address (Stree	et or PO Box, City, State, Zip)		
Date	Phone Number			

FIRM NAME, ADDRESS, & PHONE No. No. & CONTRACTOR'S REGISTRATION No. SCOPE OF WORK TO BE PERFORMED		AK BUSINESS LICENSE	
	FIRM NAME, ADDRESS, & PHONE No.	No. & CONTRACTOR'S	



STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES Civil Rights Office – DBE Program

BIDDER REGISTRATION

All firms must register annually or prior to project award with the Alaska Department of Transportation and Public Facilities (DOT&PF) Civil Rights Officer (CRO). Complete this form for each contractor and subcontractor. Firms will be listed on the bidder registration online directory <u>http://www.dot.state.ak.us/cvlrts/bidreg.shtml</u>.

Name of Firm:				
Street Address:				
Mailing Address:				
Contact Name:				
Telephone Number:				
Fax number:				
E-mail Address:				
Date Firm was Established:				
The firm listed above is a (check all	that apply):			
Prime Contractor?				
Signature of Company Represent	ative	Title		Date
Send this completed form to: ADOT&PF Civil Rights Office PO Box 196900 Anchorage, Alaska 99519-6900 If you have any questions, please call (907) 269-0851.				



CONSTRUCTION CONTRACT

Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C

Project Name and Number

This CONTRACT, between the STATE OF ALASKA, DEPARTMENT OF HEALTH & SOCIAL SERVICES, herein called the Department, acting by and through its Contracting Officer, and

Company Name

Company Address (Street or PO Box, City, State, Zip)

a/an [] Individual [] Partnership [] Joint Venture [] Sole Proprietorship [] Corporation incorporated under the laws of the State of _______, its successors and assigns, herein called the Contractor, is effective the date of the signature of the Contracting Officer on this document.

WITNESSETH: That the Contractor, for and in consideration of the payment or payments herein specified and agreed to by the Department, hereby covenants and agrees to furnish and deliver all the materials and to do and perform all the work and labor required in the construction of the above-referenced project at the prices bid by the Contractor for the respective estimated quantities aggregating approximately the sum of

Dollars

(\$ ______), and such other items as are mentioned in the original Bid, which Bid and prices named, together with the Contract Documents are made a part of this Contract and accepted as such.

It is distinctly understood and agreed that no claim for additional work or materials, done or furnished by the Contractor and not specifically herein provided for, will be allowed by the Department, nor shall the Contractor do any work or furnish any material not covered by this Contract, unless such work is ordered in writing by the Department. In no event shall the Department be liable for any materials furnished or used, or for any work or labor done, unless the materials, work, or labor are required by the Contract or on written order furnished by the Department. Any such work or materials which may be done or furnished by the Contractor without written order first being given shall be at the Contractor's own risk, cost, and expense and the Contractor hereby covenants and agrees to make no claim for compensation for work or materials done or furnished without such written order.

The Contractor further covenants and agrees that all materials shall be furnished and delivered and all labor shall be done and performed, in every respect, to the satisfaction of the Department, on or before <u>SEPTEMBER 28. 2018</u>_____.

It is expressly understood and agreed that in case of the failure on the part of the Contractor, for any reason, except with the written consent of the Department, to complete the furnishing and delivery of materials and the doing and performance of the work before the aforesaid date, the Department shall have the right to deduct from any money due or which may become due the Contractor, or if no money shall be due, the Department shall have the right to recover

Five Hundred dollars (\$500.00) per day for each calendar day elapsing between the time stipulated for the completion and the actual date of completion in accordance with the terms hereof; such deduction to be made, or sum to be recovered, not as a penalty but as liquidated damages.

The bonds given by the Contractor in the sum of \$ Payment Bond, and \$ Performance Bond, to secure the proper compliance with the terms and provisions of this Contract, are submitted herewith and made a part hereof.		
IN WITNESS WHEREOF, the parties hereto have executed this Contract and hereby agree to its terms and conditions.		
CONTRACTOR		
Company Name		
Signature of Authorized Company Representative		
Typed or Printed Name and Title		
Date		
	(Corporate Seal)	
STATE OF ALASKA DEPARTMENT OF HEALTH & SOCIAL SERVICES		
Signature of Contracting Officer		
Typed or Printed Name		
Date		



PERFORMANCE BOND

Wealth and South		
	For	
Fairl	banks Pioneer Home Generator Upgrade – AJF 18-07C	
	Project Name and Number	
KNOW ALL WHO SHALL SEE TH	IESE PRESENTS:	
That		Duivainal
ofand		as Principal,
of		as Surety,
firmly bound and held unto the State	of Alaska in the penal sum of	
		Dollars
(\$) §	good and lawful money of the United States of America for the paym	ient whereof,
jointly and severally, firmly by these		-
	ntered into a written contract with said State of Alaska, on the ne above-named project, said work to be done according to the terms	
complete all obligations and work Transportation and Public Facilities a	of the foregoing obligation are such that if the said Principal shall under said contract and if the Principal shall reimburse upon der any sums paid him which exceed the final payment determined to be ome null and void; otherwise they shall remain in full force and effect	mand of the Department of the upon completion of the
IN WITNESS WHEREOF, we have this	hereunto set our hands and seals at A.D., 20	,
	Principal:	
	Address:	
	By:	
	Contact Name:	
	Phone: ()	
Surety:		
Address:		
By:		
Contact Name:		
Phone: ()		
The offered be	ond has been checked for adequacy under the applicable statutes and regulat	ions:
Alaska Department of Health & Soci	al Services Authorized Representative Date	

See Instructions on Reverse INSTRUCTIONS

- 1. This form shall be used whenever a performance bond is required. There shall be no deviation from this form without approval from the Contracting Officer.
- 2. The full legal name, business address, phone number, and point of contact of the Principal and Surety shall be typed on the face of the form. Where more than a single surety is involved, a separate form shall be executed for each surety.
- 3. The penal amount of the bond, or in the case of more than one surety the amount of obligation, shall be typed in words and in figures.
- 4. Where individual sureties are involved, a completed Affidavit of Individual Surety shall accompany the bond. Such forms are available upon request from the Contracting Officer.
- 5. The bond shall be signed by authorized persons. Where such person is signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of authority must be furnished.



PAYMENT BOND

of Health and Soc	Bond No For	No		
Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C				
	Project Name and Number			
KNOW ALL WHO SHALL SE	EE THESE PRESENTS:			
That				
of		as Principal,		
and				
of		as Surety,		
firmly bound and held unto the	e State of Alaska in the penal sum of			
	-	Dollars		
(\$	_) good and lawful money of the United States of America for the payr	ment whereof,		
well and truly to be paid to the jointly and severally, firmly by	he State of Alaska, we bind ourselves, our heirs, successors, executors, y these presents.	administrators, and assigns,		
	has entered into a written contract with said State of Alaska, on the			
	on of the above-referenced project, said work to be done according to the			
under said contract, whether sa	the due, all just claims for labor performed and materials and supplies furnished un said labor be performed and said materials and supplies be furnished un ally authorized modifications thereto, then these presents shall become r effect.	nder the original contract, any		
IN WITNESS WHEREOF, we this	e have hereunto set our hands and seals at A.D., 20	,		
	Principal:			
	Address:			
	By:			
	Contact Name:			
	Phone: ()			
Surety:				
Address:				
By:				
Contact Name:				
Phone: ()				
The off	fered bond has been checked for adequacy under the applicable statutes and regul	ilations:		
Alaska Department of Health &	& Social Services Authorized Representative Da	ate		

See Instructions on Reverse

INSTRUCTIONS

- 1. This form, for the protection of persons supplying labor and material, shall be used whenever a payment bond is required. There shall be no deviation from this form without approval from the Contracting Officer.
- 2. The full legal name, business address, phone number, and point of contact of the Principal and Surety shall be typed on the face of the form. Where more than a single surety is involved, a separate form shall be executed for each surety.
- 3. The penal amount of the bond, or in the case of more than one surety the amount of obligation, shall be typed in words and in figures.
- 4. Where individual sureties are involved, a completed Affidavit of Individual Surety shall accompany the bond. Such forms are available upon request from the Contracting Officer.
- 5. The bond shall be signed by authorized persons. Where such persons are signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of authority must be furnished.



CONTRACTOR'S QUESTIONNAIRE

Fairbanks Pioneer Home Generator Upgrade – AJF 18-07C

Project Name and Number

A. FINANCIAL

Have you ever failed to complete a contract due to insufficient resources?
 No [] Yes If YES, explain:

2. Describe any arrangements you have made to finance this work: _____

B. EQUIPMENT

1. Describe below the equipment you have available and intend to use for this project.

ITEM	QUAN.	MAKE	MODEL	SIZE/ CAPACITY	PRESENT MARKET VALUE

2.	What percent of the total value of this contract do you intend to subcontract?%			
3.	Do you propose to purchase any equipment for use on this project? []No []Yes If YES, describe type, quantity, and approximate cost:			
4.	Do you propose to rent any equipment for this work? []No [] Yes If YES, describe type and quantity:			
5.	Is your bid based on firm offers for all materials necessary for this project? []Yes []No If NO, please explain:			
C.	EXPERIENCE			
1.	[]Yes []No			
	Describe the most recent or current contract, its completion date, and scope of work:			
2.	List, as an attachment to this questionnaire, other construction projects you have completed, the dates of completion, scope of work, and total contract amount for each project completed in the past 12 months.			
	I hereby certify that the above statements are true and complete.			
Name	of Contractor Name and Title of Person Signing			
Signat	ture Date			

INDEX TO TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

- 01 10 00 Summary of Work
- 01 12 19 Subcontractor Certification of Subcontracts
- 01 12 19 Contractor's Certification Form
- 01 26 00 Contract Modification Procedures
- 01 29 00 Payment Procedures
- 01 30 00 Administrative Requirements
- 01 40 00 Quality Requirements
- 01 42 19 Reference Standards
- 01 50 00 Temporary Facilities and Controls
- 01 60 00 Product Requirements
- 01 73 00 Cutting and Patching
- 01 77 00 Closeout Procedures
- 01 78 00 Closeout Submittals

DIVISION 23 – MECHANICAL

- 23 05 00 Common Work Results for HVAC
- 23 09 23 Direct Digital Control System for HVAC
- 23 11 11 Facility Fuel-Oil Piping

DIVISION 26 – ELECTRICAL

26 01 26	Maintenance Testing of Electrical Systems
26 05 00	Common Work Results for Electrical
26 05 05	Selective Demolition for Electrical
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 33	Raceway and Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 05 83	Wiring Connections
26 24 16	Panelboards
26 27 26	Wiring Devices
26 32 00	Packaged Generator Assemblies
26 36 00	Transfer Switches

SECTION 00800 SUPPLEMENTARY CONDITIONS MODIFICATIONS TO THE GENERAL CONDITIONS (STATE FUNDED CONTRACTS)

The following supplements modify, change, delete from, add to the "General Conditions of the Construction Contract for Buildings", revised December, 2011. Where any article of the General Conditions is modified, or and Paragraph, Subparagraph, or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph, of Clause shall remain in effect.

SC-1 – DEFINITIONS

At definition for "General Requirements" change the phrase "Divisions 2 through 16" to read: "Divisions 2 through 32."

- At definition for "Quality Assurance (QA)" change the phrase "Divisions 2 through 16" to read: "Divisions 2 through 32."
- At definition for "Quality Assurance (QA)" change the phrase "to be provided by the CONTRACTOR" to read: "to be provided by DEPARTMENT"

Add the following definitions:

- 1. **OWNER** The State of Alaska.
- QUALITY ASSURANCE ACCEPTANCE TESTING This is all sampling and testing performed by the DEPARTMENT to determine at what level the product or service will be accepted for payment. Qualified personnel and laboratories will perform sampling and testing. The DEPARTMENT pays for this testing.
- QUALITY CONTROL PROGRAM (QC PROGRAM) The CONTRACTOR'S, Subcontractor's or Supplier's operational techniques and activities that maintain control of the manufacturing process to fulfill the Contract requirements. This may include materials handling, construction procedures, calibration and maintenance of equipment, production process control, material sampling, testing and inspection, and data analysis
- 4. **RESIDENT ENGINEER** The Engineer's authorized representative assigned to make detailed observations relating to contract performance.

SC-2.4 – VISITS TO SITE/PLACE OF BUSINESS

At General Conditions Article 2.4, delete this article in its entirety.

SC-4.3 – EXPLORATIONS AND REPORTS

At General Conditions Article 4.3, add the following paragraph:

"All reports and other records (if available) are provided for informational purposes only to all plan holders listed with the DEPARTMENT as General Contractors, and are available to other planholders upon request. They are made available so Bidders have access to the same information available to the DEPARTMENT. The reports and other records are not intended as a substitute for independent investigation, interpretation, or judgment of the Bidder. The DEPARTMENT is not responsible for any interpretation or conclusion drawn from its records by the Bidder. While referenced by or provided with the Contract Documents; the recommendations, engineering details, and other information contained in these reports of explorations shall not be construed to supersede or constitute conditions of the Contract Documents."

<u>SC-5.4.1 – INSURANCE REQUIREMENTS</u>

At General Condition Article 5.4.1, delete the second to the last sentence and replace with the following: "The delivery to the DEPARTMENT of a written notice in accordance with the policy provisions is required before cancellation of any coverage or reduction in any limits of liability."

SC-5.4.2a – WORKERS COMPENSATION INSURANCE

At General Condition Article 5.4.2a, delete paragraph "a" in its entirety and replace with the following:

- "a. <u>Workers' Compensation Insurance</u>: The Contractor shall provide and maintain, for all employees of the Contractor engaged in work under this contract, Workers' Compensation Insurance as required by AS 23.30.045. The Contractor shall be responsible for Workers' Compensation Insurance for any subcontractor who provides services under this contract. Coverage shall include:
 - 1. Waiver of subrogation against the State.
 - 2. Employer's Liability Protection in the amount of \$500,000 each accident / \$500,000 each disease.
 - 3. If the Contractor directly utilizes labor outside of the State of Alaska in the prosecution of the work, "Other States" endorsement shall be required as a condition of the contract.
- 5. Whenever the work involves activity on or about navigable waters, the Workers' Compensation policy shall contain a United States Longshoreman's and Harbor Worker's Act endorsement, and when appropriate, a Maritime Employer's Liability (Jones Act) endorsement with a minimum limit of \$1,000,000."

<u>SC-5.4.2b – COMPREHENSIVE GENERAL LIABILITY INSURANCE</u>

At General Conditions Article 5.4.2b, delete minimum limits of liability items 1 and 2 in their entirety and substitute the following text:

"1. If the Contractor carries a *Comprehensive General Liability* policy, the limits of liability shall not be less than a Combined Single Limit for bodily injury, property damage and Personal Injury Liability of:

\$1,000,000 each occurrence \$2,000,000 aggregate

SC-5.4.2d – BUILDERS RISK INSURANCE

Delete General Condition Article 5.4.2d in its entirety.

SC-6.6.1 – PROGRESS SCHEDULE

At General Condition Article 6.6.1, delete this subsection and replace with the following:

"Within 14 days after the Notice to Proceed the Contractor shall submit to the DEPARTMENT for review a finalized progress schedule using the subdivisions of Work, and showing the order in which the Contractor proposes to carry on the Work and indicating starting and contemplated completion dates for the various stages of the Work. The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of the Work scheduled for completion at any time. In addition to construction activities, the progress chart shall include the submittal and approval of materials and Submittals, the procurement of critical materials and equipment, adjusting or testing subsystems, fabrication of special materials and equipment, and their installation and testing. All activities of the DEPARTMENT that affect progress including DEPARTMENT instructions, as-builts and Contract dates for beginning and completion of all parts of the Work shall be shown. The selection and number of total activities shall be subject to the DEPARTMENT's approval.

If the Contractor fails to submit a construction schedule within the time herein prescribed or revise the schedule as herein provided, the DEPARTMENT may withhold approval of the periodic payment. Even though the DEPARTMENT may review and approve a schedule prepared by the Contractor, the DEPARTMENT in no way warrants or opines that the schedule as approved is reasonable, nor does the DEPARTMENT assume any responsibility whatsoever in connection with the Contractor's schedule. The Contractor is solely responsible for all aspects of the schedule.

The Contractor shall submit to the DEPARTMENT a monthly update of the schedule above, continuing until acceptance of the Work. The monthly update shall be submitted with the Contractor's Periodic Estimate for Partial Payment, but in no event, later than the fifth of each month while the Work is in progress. The monthly update shall be revised to show Work complete and a revised order of completion of activities, if appropriate, through project completion including any effect approved changes will have on the scheduling of the remainder of the Work. Failure to provide the monthly update will be cause to withhold partial payment.

If, in the opinion of the DEPARTMENT, the Contractor falls behind its most current schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the DEPARTMENT, without additional cost to the DEPARTMENT. Failure of the Contractor to comply with the requirements of the DEPARTMENT under this Clause shall be grounds for a determination by the DEPARTMENT that the Contractor is not prosecuting the Work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the DEPARTMENT may terminate the Contractor's right to proceed with the Work, or any separable part of it, in accordance with the default terms of this Contract.

Although the Contractor is required herein to submit a schedule based upon a completion date as stated in this Contract and not sooner, the Contractor may submit a schedule for early completion provided the schedule is realistic and the DEPARTMENT's activities and milestones are met; however, the Contractor agrees, when electing an early completion schedule, that the DEPARTMENT will not be liable for damages of any kind for whatever reason including delay if the Contractor is not able to meet its earlier completion date and that all it will be entitled to is additional time, if appropriate. Permission to present a schedule with an earlier completion date does not change the Contract completion date, or time, at award, except as amended by modification to the Contract."

SC-6.6.2 – SCHEDULE OF SHOP DRAWINGS AND SCHEDULE OF VALUES

At General Condition Article 6.6.2, change the phrase "Within twenty one (21) days after the date of the Notice to Proceed,..." to read:

"Within 14 days after the Notice to Proceed..."

At General Condition Article 6.6.2, Schedule of Values, add the following text:

"Specific line item values as indicated below shall be minimum acceptable amounts and must be included on all approved Schedules of Values and Applications for Payment.

- 1. Mobilization and Demobilization: Value of Preconstruction activities, costs and submittals shall be limited to three and a half percent (3.5%) of the total Contract Price. Value of Demobilization shall be limited to one and a half percent (1.5%) of the total Contract Price.
- 2. Section 01700 Contract Closeout Procedures. Value of all required Substantial Completion Submittals and Closeout Submittals shall be not less than \$ 8,500."

SC-6.9 – SUBSTITUTES OR "OR EQUAL" ITEMS

Replace paragraph 6.9.5 with the following text:

"6.9.5 Alternate Brands / Substitutions:

a. Alternate Brands: Whenever a material, article, or piece of equipment or system is identified in the Contract Documents by reference to manufacturers' or vendors' names, trade names, catalog numbers, etc., it is intended to establish a minimum standard. Unless otherwise noted, alternate brands of any material, article, equipment, or system of other manufacturers or vendors that will perform adequately the duties imposed by the general design of the Project will be considered equally acceptable; provided the material, article, equipment, or system so proposed is, in the opinion of the DEPARTMENT, of equal substance, function, dimension, appearance, and quality. See also specification 01 60 00.

Alternate brands may be qualified if found to be equal or better, only by submitting a written request to the DEPARTMENT for approval a **minimum of fourteen (14) days in advance of the bid opening**, accompanied by description, catalog cuts, etc. and other information as may be required by the DEPARTMENT for proper evaluation of the request. Any brand named product listed in the technical specification followed by the phrase "or equal" is understood to mean an alternate product that, if presented, must be prior to bid opening as provided herein. If in the opinion of the DEPARTMENT, an alternate brand is determined to be of equal substance, function, dimension, appearance, and quality, an addendum shall be issued to all parties who have been furnished Contract Documents for bidding purposes.

b. Substitutions: A substitution will only be considered after the bid opening when deemed by the DEPARTMENT to be in its sole interest. In which case, the request shall be accompanied by a monetary proposal, full description, catalog cuts, drawings, prints, and/or test report, and such other information as may be required by the DEPARTMENT and as may be needed for proper evaluation of the request. Substitutions shall not be purchased or installed in the Project by the Contractor without the DEPARTMENT's written approval. Product substitution requests will be considered only within <u>7 days</u> after date established in the Notice to Proceed. Subsequent requests will be considered only in case of product unavailability or other conditions beyond the control of Contractor. Only one request for substitution will be considered for each product from each Prime Bidder/Contractor. When substitution is not accepted, Prime Bidder/Contractor shall provide specified product.

c. Any proposed substitution whose characteristics differ from the specified item to such an extent as to necessitate changes in the mechanical, electrical, or other basic design of the Project shall include the cost of any such changes, the design and cost of design, which costs shall be borne by the Contractor. Determination of a substitution request will be based on the DEPARTMENT's comparisons as to quality, adaptability, aesthetics, contract amount change if

applicable under Paragraph b. above, etc., between the proposed substitution and specified items."

SC-6.13.1 – SUBCONTRACTORS

Add new general conditions Article 6.13.7 as follows:

"6.13.7 The Contractor may, without penalty, replace a subcontractor who:

- 1. Fails to comply with the licensing and registration requirements of AS 08.18;
- 2. Fails to obtain or maintain a valid Alaska Business License;
- 3. Files for bankruptcy or becomes insolvent;
- 4. Fails to execute a subcontract or performance of the work for which the subcontractor was listed, and the Contractor has acted in good faith;
- 5. Fails to obtain bonding acceptable to the DEPARTMENT;
- 6. Fails to obtain insurance acceptable to the DEPARTMENT;
- 7. Fails to perform subcontract work for which the subcontractor was listed;
- 8. Must be replaced to meet the Contractor's required state or federal affirmative action requirements.
- 9. Refuses to agree to abide by the Contractor's labor agreement; or
- 10. Is determined by the DEPARTMENT to be not responsible.

In addition to the circumstances described above, a Contractor may in writing request permission from the DEPARTMENT to add a new subcontractor or replace a listed subcontractor. The DEPARTMENT will approve the request if it determines in writing that allowing the addition or replacement is in the best interest of the state.

The Contractor shall submit a written request to add a new Subcontractor or replace a listed Subcontractor to the Contracting Officer a minimum of five working days prior to the date the new Subcontractor is scheduled to begin work on the construction site. The request must state the basis for the request and include supporting documentation acceptable to the Contracting Officer.

If a Contractor violates this article, the Contracting Officer may:

- 1. Cancel the Contract after Award without any damages accruing to the Department; or
- 2. After notice and hearing, assess a penalty on the bidder in an amount not exceeding 10 percent of the value of the subcontract at issue.

<u>SC-7.2 – PERMITS, LICENSES, AND TAXES</u>

At General Condition Article 7.2.1, add the following to the end of the first sentence:

"..., including the City of Fairbanks Building Department Plan Review and general construction Building Permit fees for which the CONTRACTOR shall obtain and pay for. The Contractor is responsible for pulling the permit and obtaining on-site trade permits, and paying for and obtaining all other permits (mechanical/electrical, etc.), licenses and approvals necessary for the execution of this Contract and completion of the Work pursuant hereto.

<u>SC-7.12 – APPLICABLE ALASKA PREFERENCES</u>

- A. Add the following paragraph:
 - **7.12.5** Alaska Veteran's Preference (AS 36.30.321). In determining the low bidder for State funded projects, a 5% bid preference has been given to a bidder who qualifies under AS 36.30.321(f) as an Alaska bidder and is a Qualifying Entity. This preference may not exceed \$5,000.00. In this subsection a "Qualifying Entity" means a:

- (1) Sole proprietorship owned by an Alaska Veteran;
- (2) Partnership under AS 32.06 or AS 32.11 if a majority of the members are Alaska veterans;
- (3) Limited liability company organized under AS 10.50 and if a majority of the members are Alaska veterans; or
- (4) Corporation that is wholly owned by individuals and a majority of the individuals are Alaska veterans.

A preference under this section is in addition to any other preference for which the bidder qualifies. To qualify for this preference, the bidders must add value by the bidder actually performing, controlling, managing and supervising a significant part of the services provided or the bidder must have sold supplies or the general nature solicited to other state agencies, governments, or the general public. An Alaska veteran shall be a resident of this state and an individual who served in the Armed forces of the United States, including a reserve unit of the United States armed forces; or Alaska Territorial Guard, the Alaska Army National Guard, or the Alaska Navel Militia; and was separated from service under a condition that was not dishonorable.

The bidder shall provide an Alaskan Veteran's Preference Affidavit on Form 25D-17, certifying they qualify as an Alaska bidder eligible for Alaska Veteran's preference according to AS 36.30."

<u>SC-10.3.2 – CHANGE ORDER PRICE DETERMINATION FOR LUMP SUM CHANGE</u> ORDERS

At General Conditions Article 10.3.2, Delete this paragraph in its entirety and replace it with the following.

- "10.3.2 By mutual acceptance of a lump sum price which includes overhead and profit. The following maximum rates of cost markup (to cover both overhead and profit of the Contractor) shall be used in the negotiation of a Lump Sum Change Order:
 - a. 20% where a cost is borne directly by prime contractor (first tier contractor).
 - b. 10% where a cost is borne by a subcontractor (lower tier contractor).

Where the cost is borne by a subcontractor acting as a first tier contractor, the allowable overhead and profit markup for lump sum change orders shall not exceed 20%. Any lower tier subcontractors, including the Contractor in this case, for whom the first tier subcontractor performs the work, shall be allowed an overhead and profit markup that does not exceed 10%."

SC-11.8 – DELAY DAMAGES

At General Condition Article 11.8, add the following paragraphs:

- 11.8.1 Failure to Meet Substantial Completion Date. For each calendar day that the work is not Substantially Complete after the expiration of the Contract Time or the Substantial Completion Date has passed, the DEPARTMENT shall deduct Three Hundred Dollars (\$300.00) from progress payments.
- **11.8.2** Failure to Meet Final Completion Date. The Final completion date shall be defined as the date 60 calendar days following the substantial completion date. For each calendar day that the work is substantially complete, but the project is not at Final Completion, after the Final Completion Date has passed, the DEPARTMENT shall deduct **One Hundred**

Dollars (\$100.00) from progress payments.

- **11.8.3** If no money is due the CONTRACTOR, the DEPARTMENT shall have the right to recover these sums from the CONTRACTOR, from the Surety, or from both. These are liquidated damages and not penalties. These charges shall reimburse the DEPARTMENT for its additional expenses incurred due to CONTRACTOR'S failure to complete the work within the time specified.
- **11.8.4** Permitting the CONTRACTOR to continue and finish the work or any part of it after the Contract time has elapsed or the completion date has passed does not waive the DEPARTMENT'S rights to collect liquidated damages under this section.

SC-12.1 - WARRANTY AND GUARANTEE

At General Condition Article 12.1, add the following:

"The failure of the DEPARTMENT to strictly enforce the Contract in one or more instances does not waive its right to do so in other or future instances."

SC-12.6-CORRECTION OR REMOVAL OF DEFECTIVE WORK

At General Condition Article 12.6, add the following paragraphs:

"The CONTRACTOR shall establish necessary lines and grades before performing the Work. Work done before necessary lines and grades are established, Work contrary to the DEPARTMENT'S instructions, Work done beyond the limits of the Contract, or any extra Work done without authority, will be considered as unauthorized and shall not be paid for by the DEPARTMENT, and may be ordered removed or replaced at no additional cost to the DEPARTMENT."

SC-15.1-NOTIFICATION

In Paragraph 15.1.2, delete "Section 01310" and replace with "Section 01 33 00."

END OF SECTION 00800

THIS PAGE INTENTIONALLY LEFT BLANK

Laborers' & Mechanics' Minimum Rates of Pay

Effective September 1, 2017 Issue 35

Title 36. Public Contracts AS 36.05 & AS 36.10 Wage & Hour Administration Pamphlet No. 600

ALASKA DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT

- This page intentionally left blank -



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

September 1, 2017

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 and resident hire requirements.

This pamphlet identifies current prevailing wage rates and resident hire classifications 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, this publication is printed in the spring and fall of every year, so please be sure you are using the appropriate rates. The rates published in this edition become effective September 1, 2017.

All projects with a final bid date of September 11, 2017, or later, must pay the prevailing wage rates contained in this pamphlet. 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, contact the nearest office of the Division of Labor Standards and Safety, Wage and Hour office or the Web address at: <u>http://labor.state.ak.us/lss/pamp600.htm</u>

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

Sincerely,

Heidi Drygas

Commissioner

Table of Contents

Excerpts from Alaska Law

Sec. 36.05.005. Applicability	.iii
Sec. 36.05.010. Wage rates on public construction.	iii
Sec. 36.05.040. Filing schedule of employees, wages paid and other information	iii
Sec. 36.05.045. Notice of work and completion; withholding of payment	iii
Sec. 36.05.060. Penalty for violation of this chapter	iv
Sec. 36.05.070. Wage rates in specifications and contracts for public works	iv
Sec. 36.05.080. Failure to pay agreed wages	iv
Sec. 36.05.090. Payment of wages from withheld payments and listing contractors who violate contracts	iv
Sec. 36.05.900. Definition.	v

Additional Information

Laborer Classification Clarificationv
Accommodations and Per Diemv
Apprentice Hiring Requirements vi
Apprentice Rates
Fringe Benefit Plansvii
Special Prevailing Wage Rate Determination vii
Request for Notice of Proposed Change of Labor Standards Regulations ix
Alaska Hire Employment Preferencex
Debarment List xi

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 the current laws and regulations, please refer to the official codes.

EXCERPTS FROM ALASKA LAW

(*The following statute (36.05.005) applies to projects bid on or after October 20, 2011)* 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 <u>AS 36.05.070</u> 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'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 <u>AS 36.05.070</u>, 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.

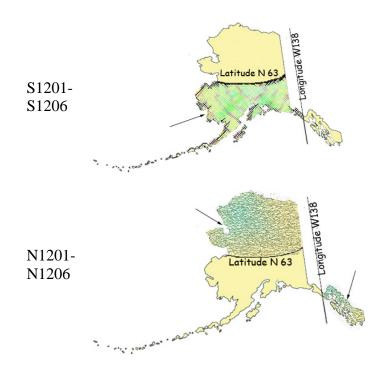
Sec. 36.05.900. Definition.

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.

ADDITIONAL INFORMATION

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:



ACCOMMODATIONS AND PER DIEM

The Alaska Department of Labor and Workforce Development has adopted a per diem requirement for blocklayers, bricklayers, carpenters, dredgemen, heat & frost insulators/asbestos workers, ironworkers, laborers, operative plasterers & cement masons, painters, piledrivers, power equipment operators, roofers, surveyors, truck

drivers/surveyors, and tunnel workers. This per diem rate creates an allowable alternative to providing board and lodging under the following conditions:

Employer-Provided Camp or Suitable Accommodations

Unless otherwise approved by the Commissioner, the employer shall ensure that a worker who is employed on a project that is 65 road miles or more from the international airport in either Fairbanks, Juneau or Anchorage or is inaccessible by road in a 2-wheel drive vehicle and who is not a domiciled resident of the locality of the project shall receive meals and lodging. Lodging shall be in accordance with all applicable state and federal laws. In cases where the project site is not road accessible, but the employee can reasonably get to the project worksite from their permanent residence within one hour, the Commissioner may waive these requirements for that employee upon a written request from the employer.

The term "domiciled resident" means a person living within 65 road miles of the 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 project. However, if the employer or person provides sufficient evidence to convince the department that a person has established a permanent residence and an intent to remain indefinitely within the distance to be considered a "domiciled resident," the employer shall not be required to provide meals and lodging or pay per diem.

Where the employer provides or furnishes board, lodging or any other facility, the cost or amount thereof shall not be considered or included as part of the required prevailing wage basic hourly rate and cannot be applied to meet other fringe benefit requirements. The taxability of employer provided board and lodging shall be determined by the appropriate taxation enforcement authority.

Per Diem

Employers are encouraged to use commercial facilities and lodges; however, when such facilities are not available, per diem in lieu of meals and lodging must be paid at the basic rate of \$75.00 per day, or part thereof, the worker is employed on the project. Per diem shall not be allowed on highway projects west of Livengood on the Elliott Highway, at Mile 0 of the Dalton Highway to the North Slope of Alaska, north of Mile 20 on the Taylor Highway, east of Chicken, Alaska, on the Top of the World Highway and south of Tetlin Junction to the Alaska-Canada border.

The above-listed standards for room and board and per diem only apply to the crafts as identified in Pamphlet 600, *Laborers' and Mechanics' Minimum Rates of Pay*. Other crafts working on public construction projects shall be provided room and board at remote sites based on the department's existing policy guidelines. In the event that a contractor provides lodging facilities, but no meals, the department will accept payment of \$36 per day for meals to meet the per diem requirements.

**** NEW ** APPRENTICE HIRING REQUIREMENTS**

On November 5, 2015, Governor Walker signed Administrative Order No. 278 to help ensure that there is an adequate pool of well-trained Alaskan construction workers to satisfy the industry needs. AO 278 replaced AO 226 and established a 15 percent goal for hiring federally registered apprentices in certain job categories on all public construction projects awarded by the Alaska Department of Transportation and Public Facilities and the Alaska Department of Administration that exceed \$2.5 million. The Order requires the commissioners of DOTPF and DOA to strive to require not less than 15 percent labor hours on a qualified project are performed by federally registered apprentices in the following classifications:

Boilermakers	Elevator Constructors & Mechanics	Plumbers and Pipefitters
Bricklayers	Insulation Workers	Roofers
Carpenters	Ironworkers	Sheetmetal Workers
Cement Masons	Laborers	Surveyors

Culinary Workers Electricians Equipment Operators Mechanics Millwrights Painters Piledriving Occupations Sprinkler Fitters Truck Drivers Tug Boat Workers Welders

A federally registered apprentice is enrolled in an apprentice training program under 29 U.S.C. 50 and 29 C.F.R. 29.1 – 29.13. Contractors will be expected to file apprentice utilization forms throughout the project or utilize the online certified payroll filing system available on the My Alaska website. A copy of AO 278 may be viewed in its entirety at <u>http://gov.state.ak.us/admin-orders/278.html</u> or call any Wage and Hour office to receive a copy.

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 & Safety Division Wage and Hour Administration P.O. Box 111149 Juneau, AK 99811-1149 -or-Email: anchorage.lss-wh@alaska.gov

LABOR STANDARDS REGULATIONS NOTICE REQUEST

If you would like to receive *notices of proposed changes to regulations* for Wage and Hour or Mechanical Inspection, please indicate below the programs for which you are interested in receiving such notices, print your name and email or mailing address in the space provided, and send this page to:

Alaska Department of Labor and Workforce Development Labor Standards & Safety Division Wage and Hour Administration 1251 Muldoon Road, Suite 113 Anchorage, AK 99504-2098 Email: anchorage.lss-wh@alaska.gov

For *REGULATIONS* information relating to any of the following:

- □ Wage and Hour Title 23 Employment Practices
- □ Wage and Hour Title 36 Public Works
- **D** Employment Agencies
- Child Labor
- Employment Preference (Local Hire)
- Plumbing Code
- Electrical Code
- D Boiler/Pressure Vessel Construction Code
- Elevator Code
- Certificates of Fitness
- □ Recreational Devices

Request any of the following PUBLICATIONS by checking below:

- □ Wage and Hour Title 23 Employment Practices
- ☐ Minimum Wage & Overtime Poster
- Child Labor Poster

- D Public Construction Pamphlet
- D Public Construction Wage Rates
- Child Labor Pamphlet

PLEASE NOTE: DUE TO INCREASED MAILING AND PRINTING COSTS, ONLY ONE OF EACH PUBLICATION REQUESTED WILL BE MAILED TO YOU. IF YOU WISH TO RECEIVE ADDITIONAL COPIES OR SUBSEQUENT PUBLICATIONS, PLEASE CONTACT OUR OFFICE AT (907) 269-4900.

Name:	 	
Mailing Address:	 	
Email Address:	 	

DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT ALASKA EMPLOYMENT PREFERENCE INFORMATION

By authority of <u>AS 36.10.150</u> and <u>8 AAC 30.064</u>, the Commissioner of Labor and Workforce Development has determined the State of Alaska to be a Zone of Underemployment. A Zone of Underemployment requires that Alaska residents who are eligible under <u>AS 36.10.140</u> be given a minimum of 90 percent employment preference on public works contracts throughout the state in certain job classifications. **This 90 percent Alaska resident hiring preference applies on a project-by-project, craft-by-craft or occupational basis and must be met each workweek by each contractor/subcontractor in each of the following classifications:**

Boilermakers	Electricians	Laborers	Roofers
Bricklayers	Engineers & Architects	Mechanics	Sheet Metal Workers
Carpenters	Equipment Operators	Millwrights	Surveyors
Cement Masons	Foremen & Supervisors	Painters	Truck Drivers
Culinary Workers	Insulation Workers	Piledriving Occupations	Tug Boat Workers
	Ironworkers	Plumbers & Pipefitters	Welders

This determination became effective July 1, 2017, and remains in effect through June 30, 2019. This determination will be applied to projects with a bid submission deadline on or after July 1, 2017 and to projects previously covered by the 2015 Alaska employment preference determination. This will afford contractors an opportunity to consider the impacts of Alaska resident hire in their bids.

The first person on a certified payroll in any classification is called the "first worker" and is not required to be an Alaskan resident. However, once the contractor adds any more workers in the classification, then all workers in the classification are counted, and the 90 percent calculation is applied to compute the number of required Alaskans to be in compliance. To compute the number of Alaskan residents required in a workweek in a particular classification, multiply the total number of workers in the classification by 90 percent. The result is then rounded down to the nearest whole number to determine the number of Alaskans that must be employed in that classification.

If a worker works in more than one classification during a week, the classification in which they spent the most time would be counted for employment preference purposes. If the time is split evenly between two classifications, the worker is counted in both classifications.

If you have difficulty meeting the 90 percent requirement, an approved waiver must be obtained <u>before</u> a non-Alaska resident is hired who would put the contractor/subcontractor out of compliance (<u>8 AAC 30.081 (e) (f)</u>). The waiver process requires proof of an adequate search for qualified Alaskan workers. Qualified Alaska residents identified through the search must be hired before waivers for non-resident workers may be granted. To apply for a waiver, contact the nearest Wage and Hour Office for instructions.

Here is an example to apply the 90 percent requirement to four boilermaker workers. Multiply four workers by 90% and drop the fraction (.90 X 4 = 3.6 - .6 = 3). The remaining number is the number of Alaskan resident boilermakers required to be in compliance in that particular classification for that week.

The penalties for being out of compliance are serious. <u>AS 36.10.100</u> (a) states "A contractor who violates a provision of this chapter shall have deducted from amounts due to the contractor under the contract the prevailing wages which should have been paid to a displaced resident and these amounts shall be retained by the contracting agency." If a contractor/subcontractor is found to be out of compliance, penalties accumulate until they come into compliance.

Contractors are responsible for determining residency status. If you have difficulty determining whether a worker is an Alaska resident, you should contact the nearest Wage and Hour Office. Contact Wage and Hour in Anchorage at (907) 269-4900, in Fairbanks at (907) 451-2886, or in Juneau at (907) 465-4842.

Alaska Department of Labor and Workforce Development Labor Standards & Safety Division Wage and Hour Administration Web site: http://labor.state.ak.us/lss/pamp600.htm

Anchorage

1251 Muldoon Road, Suite 113 Anchorage, Alaska 99504-2098 Phone: (907) 269-4900

Email: anchorage.lss-wh@alaska.gov Juneau

1111 W. 8th Street, Suite 302 Juneau, Alaska 99801 Phone: (907) 465-4842

Email: juneau.lss-wh@alaska.gov

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.

Company Name

Bengal Groups, LLC Mohammed Ali, Individual Fry's Services, LLC John Paul Freie, Individual Pyramid Audio & Video, Ltd. Jeffrey P. Schneider, Individual **Debarment Expires**

November 3, 2017 November 3, 2017 November 16, 2017 November 16, 2017 June 19, 2018 June 19, 2018

Fairbanks

Regional State Office Building 675 7th Ave., Station J-1 Fairbanks, Alaska 99701-4593 Phone: (907) 451-2886 Email: fairbanks.lss@alaska.gov

Laborers' & Mechanics' Minimum Rates of Pay

Code Classification of Laborers & Mechanics	вик п		FL IN	INN	Other I	Denents	, 1111
Boilermakers							
A0101 Boilermaker (journeyman)	44.26	8.57	15.34	1.60	VAC 3.00	SAF 0.34	73.1
Bricklayers & Blocklayers							
**See note on last page if remote site							
					L&M		
A0201 Blocklayer	40.81	9.53	8.50	0.55	0.15	0.61	60.1
Bricklayer							
Marble or Stone Mason							
Refractory Worker (Firebrick, Plastic, Castable, and Gunite Refractory Applications)							
Terrazzo Worker							
Tile Setter							
	10.01				L&M		10
A0202 Tuck Pointer Caulker	40.81	9.53	8.50	0.55	0.15	0.61	60.
Cleaner (PCC)							
A0203 Marble & Tile Finisher	34.79	9.53	8.50	0.55	L&M 0.15	0.61	54.1
Terrazzo Finisher							
					L&M		
A0204 Torginal Applicator	38.83	9.53	8.50	0.55	0.15	0.61	58.1
Carpenters, Statewide							
**See note on last page if remote site							
					L&M	SAF	
A0301 Carpenter (journeyman)	38.34	9.78	14.56	0.70	0.10	0.15	63.6
Lather/Drywall/Acoustical							
Cement Masons, Region I (North of N63 latitude)							
**See note on last page if remote site							
					L&M		
N0401 Group I, including:	37.50	1.43	11.80	1.18	0.10		58.0
Application of Sealing Compound							
Application of Underlayment							
Building, General							
Cement Mason (journeyman)							

PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=total hourly rate;

VAC=vacation

Code Classification of Laborers & Mechanics		
Cement Masons, Region I (North of N63 latitude)		
**See note on last page if remote site		
	L&M	
N0401 Group I, including:	37.50 7.43 11.80 1.18 0.10	58.0
Concrete		
Concrete Paving		
Curb & Gutter, Sidewalk		
Curing of All Concrete		
Grouting & Caulking of Tilt-Up Panels		
Grouting of All Plates		
Patching Concrete		
Screed Pin Setter		
Spackling/Skim Coating		
	L&M	
N0402 Group II, including:	37.50 7.43 11.80 1.18 0.10	58.0
Form Setter		
1 oniti Setter	L&M	
N0403 Group III, including:	37.50 7.43 11.80 1.18 0.10	58.0
Concrete Saw (self-powered)		
Curb & Gutter Machine		
Floor Grinder		
Pneumatic Power Tools		
Power Chipping & Bushing		
Sand Blasting Architectural Finish		
Screed & Rodding Machine Operator		
Troweling Machine Operator		
	L&M	50.0
N0404 Group IV, including:	37.50 7.43 11.80 1.18 0.10	58.0
Application of All Composition Mastic		
Application of All Epoxy Material		
Application of All Plastic Material		
Finish Colored Concrete		
Gunite Nozzleman		
Hand Powered Grinder		
Tunnel Worker		
	L&M	
N0405 Group V, including:	37.75 7.43 11.80 1.18 0.10	58.2
Plasterer		
Cement Masons, Region II (South of N63 latitude)		

**See note on last page if remote site

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;

Class

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benefits TH
<mark>Ceme</mark> i	nt Masons, Region II (South of N63 latitude)	
;	**See note on last page if remote site	
S0401	Group I, including:	L&M 37.25 7.43 11.80 1.18 0.10 57.7
	Application of Sealing Compound	
	Application of Underlayment	
	Building, General	
	Cement Mason (journeyman)	
	Concrete	
	Concrete Paving	
	Curb & Gutter, Sidewalk	
	Curing of All Concrete	
	Grouting & Caulking of Tilt-Up Panels	
	Grouting of All Plates	
	Patching Concrete	
	Screed Pin Setter	
	Spackling/Skim Coating	
	Sparring, shine county	L&M
S0402	Group II, including:	37.25 7.43 11.80 1.18 0.10 57.7
	Form Setter	
		L&M
S0403	Group III, including:	37.25 7.43 11.80 1.18 0.10 57.7
	Concrete Saw (self-powered)	
	Curb & Gutter Machine	
	Floor Grinder	
	Pneumatic Power Tools	
	Power Chipping & Bushing	
	Sand Blasting Architectural Finish	
	Screed & Rodding Machine Operator	
	Troweling Machine Operator	
	Howening Machine Operator	L&M
S0404	Group IV, including:	37.25 7.43 11.80 1.18 0.10 57.7
	Application of All Composition Mastic	
	Application of All Epoxy Material	
	Application of All Plastic Material	
	Finish Colored Concrete	
	Gunite Nozzleman	
	Hand Powered Grinder	
	Tunnel Worker	
		L&M
S0405	Group V, including:	37.50 7.43 11.80 1.18 0.10 58.0
	Plasterer	

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	
Culing	ry Workers * See note on last page	
C HIIN	ITV WORKERS * See note on tast hage	

	170	
28.37 7.40 6.97	LEG 0.07	42.8
	LEG	
25.05 7.40 6.97	0.07	39.49
	LEG	
28.97 7.40 6.97	0.07	43.4
	LEG	
25.45 7.40 6.97	0.07	39.89
	L&M	
39.51 9.30 12.25 1.0	0 0.10	62.1
	L&M	
38.35 9.30 12.25 1.0		61.00
	L&M	
38.79 9.30 12.25 1.0	0 0.10	61.44
	L&M	
42.04 9.30 12.25 1.0	0 0.10	64.6
40.00 0.00 10.05 1.0	L&M	(2.0
40.28 9.30 12.25 1.0		62.9
30 51 0 30 12 25 1 (62.1
37.31 7.30 12.23 1.0		02.1
38.79 9.30 12.25 10		61.4
2017 7.00 12.20 1.0		
	25.05 7.40 6.97 28.97 7.40 6.97 25.45 7.40 6.97 39.51 9.30 12.25 1.0 38.35 9.30 12.25 1.0 38.79 9.30 12.25 1.0 42.04 9.30 12.25 1.0 39.51 9.30 12.25 1.0 39.51 9.30 12.25 1.0 39.51 9.30 12.25 1.0 39.51 9.30 12.25 1.0	25.05 7.40 6.97 LEG 28.97 7.40 6.97 LEG 28.97 7.40 6.97 LEG 25.45 7.40 6.97 LEG 39.51 9.30 12.25 1.00 0.10 L&M 38.35 9.30 12.25 1.00 0.10 L&M 38.79 9.30 12.25 1.00 0.10 L&M 38.79 9.30 12.25 1.00 0.10 42.04 9.30 12.25 1.00 0.10

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 P	EN I	ſRN	Other	Benefits	THR
Electri	cians						
<u>A0701</u>	Inside Cable Splicer	39.82 12.67 13	8.01 ().95	L&M 0.20	LEG 0.15	66.80
A0702	Inside Journeyman Wireman, including:	39.49 12.67 13	8.25 ().95	L&M 0.20	LEG 0.15	66.71
	Technicians						
<u>A0703</u>	Power Cable Splicer	52.27 12.67 18	8.76 ().95	L&M 0.20	LEG 0.15	85.00
A0704	Tele Com Cable Splicer	47.45 12.67 15	5.44 ().95	L&M 0.20	LEG 0.15	76.86
A0705	Power Journeyman Lineman, including:	50.52 12.67 18	3.71 ().95	L&M 0.20	LEG 0.15	83.20
	Power Equipment Operator Technician						
A0706	Tele Com Journeyman Lineman, including:	45.70 12.67 15	5.39 ().95	L&M 0.20	LEG 0.15	75.06
	Technician						
	Tele Com Equipment Operator				T 8-M	LEG	
A0707	Straight Line Installer - Repairman	45.70 12.67 15	5.39 ().95	0.20	0.15	75.06
A0708	Powderman	48.52 12.67 18	8.65 ().95	L&M 0.20	LEG 0.15	81.14
A0710	Material Handler	26.57 11.97 4.	.80 (0.15	L&M 0.15	LEG 0.15	43.79
A0712	Tree Trimmer Groundman	27.17 12.67 11	56 () 15	L&M 0.15	LEG 0.15	51.85
					L&M	LEG	
<u>AU/13</u>	Journeyman Tree Trimmer	35.84 12.67 11	.82 (J.15	0.15	0.15	60.78
<u>A0714</u>	Vegetation Control Sprayer	39.29 12.67 11	.92 (0.15	0.15	LEG 0.15	64.33
<u>A0715</u>	Inside Journeyman Communications CO/PBX	38.07 12.67 12	2.96 ().95	L&M 0.20	LEG 0.15	65.00
Elevat o	or Workers						
					1.035	THE	
A0802	Elevator Constructor	37.63 15.28 15	5.71 (0.60	L&M 0.30	VAC 3.43	72.95

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 B	Benefits	THR
Elevator Workers					
A0803 Elevator Constructor Mechanic	53.76 15.28 15.71	0.60	L&M 0.30	VAC 5.97	91.62
Heat & Frost Insulators/Asbestos Workers					
**See note on last page if remote site					
			SAF		
A0902 Asbestos Abatement-Mechanical Systems	38.68 9.24 9.51	1.20	0.12		58.75
			SAF		
A0903 Asbestos Abatement/General Demolition All Systems	38.68 9.24 9.51	1.20	0.12		58.75
			SAF		
A0904 Insulator, Group II	38.68 9.24 9.51	1.20	0.12		58.75
			SAF		
A0905 Fire Stop	38.68 9.24 9.51	1.20	0.12		58.75
IronWorkers					
**See note on last page if remote site					
			L&M	IAF	
A1101 Ironworkers, including:	37.25 8.33 20.53	1.57	0.20	0.36	68.24
Bender Operators					
Bridge & Structural					
Machinery Mover					
Ornamental					
Reinforcing					
Rigger					
Sheeter					
Signalman					
Stage Rigger					
Toxic Haz-Mat Work					
Welder					
			L&M	IAF	
A1102 Helicopter	38.25 8.33 20.53	1.57	0.20	0.36	69.24
Tower (energy producing windmill type towers to include nacelle and blades)					
	22.75 8.22 20.20	1 477	L&M	IAF	CA 20
A1103 Fence/Barrier Installer	33.75 8.33 20.28	1.47	0.20	0.36	64.39
Guard Rail Installer					
A1104 Guard Rail Layout Man	34.49 8.33 20.28	1.47	L&M 0.20	IAF 0.36	65.13
	2 0.00 20.20	/	0.20	0.00	55.15

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;

Classification of Laborers & Mechanics

aborers (The Alaska areas north of N63 latitude and east of W138	longitud	e)					
**See note on last page if remote site							
1201 Group I, including:	30.55	5 8.21	17.06	1.25	L&M 0.20	LEG 0.20	57.4
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, grouting, curing, screed	ing)						
Crusher Plant Laborer	8/						
Demolition Laborer							
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							
Watchman (construction projects)							
Window Cleaner							
202 Group II, including:	31 54	5 8 2 1	17.06	1 25	L&M 0.20	LEG 0.20	58

N1202 Group II, including:

31.55 8.21 17.06 1.25 0.20 0.20 58.47

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

Code Classification of Laborers & Mechanics

orers (The Alaska areas north of N63 latitude and east of W138 **See note on last page if remote site	iongituu	<i>c)</i>					
)2 Group II, including:	31.55	5 8.21	17.06	1.25	L&M 0.20	LEG 0.20	58.
Burning & Cutting Torch							
Cement or Lime Dumper or Handler (sack or bulk)							
Certified Erosion Sediment Control Lead (CESCL Laborer)							
Choker Splicer							
Choker Spheer Chucktender (wagon, air-track & hydraulic drills)							
Concrete Laborer (power buggy, concrete saws, pumpcrete nozzlemar vibratorman)	1,						
Culvert Pipe Laborer							
Cured Inplace Pipelayer							
Environmental Laborer (asbestos, marine work)							
Foam Gun or Foam Machine Operator							
Green Cutter (dam work)							
Gunite Operator							
Hod Carrier							
Jackhammer or Pavement Breaker (more than 45 pounds)							
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	
03 Group III, including:	32.45	8.21	17.06	1.25	0.20	0.20	59
Bit Grinder							
Camera/Tool/Video Operator							
Cullera 1001/ (1000 Operator							

Camera/Tool/Video Operator Guardrail Machine Operator High Rigger & Tree Topper High Scaler Multiplate

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

** Characterized last many life many life	ngitude)						
**See note on last page if remote site							
1203 Group III, including:	32.45 8.3	.21	17.06	1.25	L&M 0.20	LEG 0.20	59.:
Plastic Welding							
Slurry Seal Squeegee Man							
Traffic Control Supervisor							
Welding Certified (in connection with laborer's work)							
weighing certified (in connection with faborer's work)					L&M	IFC	
1204 Group IIIA	35.73 8.	21	17.06	1.25	0.20	0.20	62.
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)							
Licensed Powderman							
Pioneer Drilling & Drilling Off Tugger (all type drills)							
Pipelayers							
Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)							
					L&M	LEG	
1205 Group IV	20.12 8.	21	17.06	1.25	0.20	0.20	47.
Final Building Cleanup							
Permanent Yard Worker							
					L&M	LEG	
1206 Group IIIB	39.27 5.	50	17.06	1.25	0.20	0.20	63.
Federally Licensed Powderman (Responsible Person in Charge)							
Grade Checking (setting or transferring of grade marks, line and grade,							
Stake Hopper)							
	zitude)						
aborers (The area that is south of N63 latitude and west of W138 long	,						
aborers (The area that is south of N63 latitude and west of W138 long **See note on last page if remote site					I & M	IFC	
**See note on last page if remote site	30.55 8.3	21	17.06	1.25	L&M 0.20	LEG 0.20	57.
**See note on last page if remote site 1201 Group I, including:	30.55 8.	21	17.06	1.25			57.
**See note on last page if remote site 1201 Group I, including: Asphalt Worker (shovelman, plant crew)	30.55 8.	21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: Asphalt Worker (shovelman, plant crew) Brush Cutter 	30.55 8.	21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: Asphalt Worker (shovelman, plant crew) Brush Cutter Camp Maintenance Laborer 	30.55 8.	21	17.06	1.25			57.
 **See note on last page if remote site <u>1201</u> Group I, including: Asphalt Worker (shovelman, plant crew) Brush Cutter Camp Maintenance Laborer Carpenter Tender or Helper 	30.55 8.	21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: Asphalt Worker (shovelman, plant crew) Brush Cutter Camp Maintenance Laborer Carpenter Tender or Helper Choke Setter, Hook Tender, Rigger, Signalman 		21	17.06	1.25			57.
 **See note on last page if remote site <u>1201</u> Group I, including: Asphalt Worker (shovelman, plant crew) Brush Cutter Camp Maintenance Laborer Carpenter Tender or Helper 		21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: 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, grouting, curing, screeding 		21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: 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, grouting, curing, screeding Crusher Plant Laborer 		21	17.06	1.25			57.
 **See note on last page if remote site 1201 Group I, including: 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, grouting, curing, screeding Crusher Plant Laborer Demolition Laborer 		21	17.06	1.25			57.
1201 Group I, including: 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, grouting, curing, screeding Crusher Plant Laborer Demolition Laborer Ditch Digger		21	17.06	1.25			57

VAC=vacation

Classification of Laborers & Mechanics

2	**See note on last page if remote site							
1201	Group I, including:	30.55	8.21	17.06	5 1.25	L&M 0.20	LEG 0.20	57.4
	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							
	Watchman (construction projects)							
	Window Cleaner							
						L&M	LEG	
202	Group II, including:	31.55	8.21	17.06	5 1.25	0.20	0.20	58.
	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, pumpcrete nozzleman, vibratorman)							
	Culvert Pipe Laborer							
	Cured Inplace Pipelayer							
	Environmental Laborer (asbestos, marine work)							
	Foam Gun or Foam Machine Operator							

VAC=vacation

e Classification of Laborers & Mechanics

	L&M 0.20	LEG 0.20	<u>58.</u>
Green Cutter (dam work) Gunite Operator Hod Carrier Jackhammer or Pavement Breaker (more than 45 pounds) 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	0.20	0.20	58.4
Gunite OperatorHod CarrierJackhammer or Pavement Breaker (more than 45 pounds)Laser Instrument OperatorLaying of Mortarless Decorative Block (retaining walls, flowered decorative block over 4 feet - highway or landscape work)Mason Tender & Mud Mixer (sewer work)Pilot CarPipelayer HelperPlasterer, Bricklayer & Cement Finisher TenderPowderman HelperPower Saw OperatorRailroad Switch Layout LaborerSandblasterScaffold Building & ErectingSewer CaulkerSewer Plant Maintenance Man			
 Hod Carrier Jackhammer or Pavement Breaker (more than 45 pounds) 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 Power Saw Operator Railroad Switch Layout Laborer Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man 			
Jackhammer or Pavement Breaker (more than 45 pounds)Laser Instrument OperatorLaying of Mortarless Decorative Block (retaining walls, flowered decorative block over 4 feet - highway or landscape work)Mason Tender & Mud Mixer (sewer work)Pilot CarPipelayer HelperPlasterer, Bricklayer & Cement Finisher TenderPowderman HelperPower Saw OperatorRailroad Switch Layout LaborerSandblasterScaffold Building & ErectingSewer CaulkerSewer Plant Maintenance Man			
Laser Instrument OperatorLaying of Mortarless Decorative Block (retaining walls, flowered decorative block over 4 feet - highway or landscape work)Mason Tender & Mud Mixer (sewer work)Pilot CarPipelayer HelperPlasterer, Bricklayer & Cement Finisher TenderPowderman HelperPower Saw OperatorRailroad Switch Layout LaborerSandblasterScaffold Building & ErectingSewer CaulkerSewer Plant Maintenance Man			
 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 			
 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 			
 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 			
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			
Plasterer, Bricklayer & Cement Finisher Tender Powderman Helper Power Saw Operator Railroad Switch Layout Laborer Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Powderman Helper Power Saw Operator Railroad Switch Layout Laborer Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Power Saw Operator Railroad Switch Layout Laborer Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Railroad Switch Layout Laborer Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Sandblaster Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Scaffold Building & Erecting Sewer Caulker Sewer Plant Maintenance Man			
Sewer Caulker Sewer Plant Maintenance Man			
Sewer Plant Maintenance Man			
Thermal Plastic Applicator			
11			
Timber Faller, Chainsaw Operator, Filer			
Timberman			
		LEG	
1203 Group III, including: 32.45 8.21 17.06 1.25	0.20	0.20	<u>59.3</u>
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		
1204 Group IIIA 35.73 8.21 17.06 1.25	0.20	0.20	62.0
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)			
Licensed Powderman			
Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement fund; LEG=legal fund; L&M=labor// PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LEG combined; TRN=training; THR=to			
VAC=vacation Issue 35 Effective Sentember 1 2017	otal hourly	rate;	

Laborers (The area that is south of N63 latitude and west of W138 lor	-Studie)					
**See note on last page if remote site						
S1204 Group IIIA	35.73 8.2	21 17.0)6 1.25	L&M 0.20	LEG 0.20	62.6
Pioneer Drilling & Drilling Off Tugger (all type drills)						
Pipelayers						
Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)						
				L&M	LEG	
S1205 Group IV	20.12 8.2	21 17.0	6 1.25	0.20	0.20	47.0
Final Building Cleanup						
Permanent Yard Worker						
				L&M	LEG	
S1206 Group IIIB	39.27 5.5	50 17.0	6 1.25	0.20	0.20	63.4
Federally Licensed Powderman (Responsible Person in Charge) Grade Checking (setting or transferring of grade marks, line and grade, Stake Hopper)						
Stake Hopper)						
Millwrights						
				L&M		
A1251 Millwright (journeyman)	3674 07	10 10	21 1.00		0.05	60.
Hild I film (Joanne) man)	30.74 9.7	0 12.2				
Aller Almonghe (Journey) Maily	30.74 9.7	0 12.2	1 1100	TONE		
				L&M 0.40	0.05	61
A1252 Millwright Welder	37.74 9.7			L&M 0.40	0.05	61.1
A1252 Millwright Welder					0.05	61.1
A1252 Millwright Welder Painters, Region I (North of N63 latitude)					0.05	61.1
A1252 Millwright Welder				0.40	0.05	61.1
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	61.1 52.3
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including:		78 12.2	21 1.00	0.40	0.05	<u>61.1</u> 52.3
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler	37.74 9.7	78 12.2	21 1.00	0.40 L&M	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.:
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement	37.74 9.7	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.:
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll N1302 Group II, including: Bridge Painter	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.2
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll N1302 Group II, including: Bridge Painter Epoxy Applicator	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.2
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll N1302 Group II, including: Bridge Painter Epoxy Applicator General Drywall Finisher	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.2
A1252 Millwright Welder Painters, Region I (North of N63 latitude) **See note on last page if remote site N1301 Group I, including: Brush General Painter Hand Taping Hazardous Material Handler Lead-Based Paint Abatement Roll N1302 Group II, including: Bridge Painter Epoxy Applicator	37.74 9.7 31.99 8.1	1 11.1	21 1.00	0.40 L&M 0.07	0.05	52.:

VAC=vacation

Class Code Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benefits THI
Painters, Region I (North of N63 latitude)	
**See note on last page if remote site	
	L&M
N1302 Group II, including:	32.51 8.11 11.10 1.08 0.07 52.8
Machine/Automatic Taping	
Pot Tender	
Sandblasting	
Specialty Painter	
Spray	
Structural Steel Painter	
Wallpaper/Vinyl Hanger	
N1304 Group IV, including:	38.63 8.11 13.23 1.05 0.05 61.0
Glazier	
Storefront/Automatic Door Mechanic	
N1305 Group V, including:	29.23 8.11 5.02 0.83 0.07 43.2
Carpet Installer	
Floor Coverer	
Heat Weld/Cove Base	
Linoleum/Soft Tile Installer	
Painters, Region II (South of N63 latitude)	
**See note on last page if remote site	
S1201 Course Lingle diago	L&M
S1301 Group I, including :	30.23 8.11 10.85 1.08 0.07 50.3
Brush	
General Painter	
Hand Taping	
Hazardous Material Handler	
Lead-Based Paint Abatement	
Roll	
Spray	
S1302 Group II, including :	L&M 31.48 8.11 10.85 1.08 0.07 51.5
General Drywall Finisher	
Hand/Spray Texturing	
Machine/Automatic Taping	
Wallpaper/Vinyl Hanger	
	L&M
S1303 Group III, including :	31.58 8.11 10.85 1.08 0.07 51.6
Bridge Painter	
Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry	

Class Code Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benefits THR
Painters, Region II (South of N63 latitude)	
**See note on last page if remote site	
S1303 Group III, including :	L&M 31.58 8.11 10.85 1.08 0.07 51.69
Epoxy Applicator	
Industrial Coatings Specialist	
Pot Tender	
Sandblasting	
Specialty Painter Structural Steel Painter	
Structural Steel Painter	L&M
S1304 Group IV, including:	38.63 8.11 12.48 1.08 0.07 60.37
Glazier	
Storefront/Automatic Door Mechanic	
Storenone Automatic Door Mechanic	L&M
S1305 Group V, including:	29.23 8.11 5.02 0.83 0.07 43.26
Carpet Installer	
Floor Coverer	
Heat Weld/Cove Base	
Linoleum/Soft Tile Installer	
Piledrivers	
**See note on last page if remote site	
	L&M IAF
A1401 Piledriver	38.34 9.78 14.56 0.70 0.10 0.15 63.63
Assistant Dive Tender	
Carpenter/Piledriver	
Rigger	
Sheet Stabber	
Skiff Operator	
	L&M IAF
A1402 Piledriver-Welder/Toxic Worker	39.34 9.78 14.56 0.70 0.10 0.15 64.63
	L&M IAF
A1403 Remotely Operated Vehicle Pilot/Technician	42.65 9.78 14.56 0.70 0.10 0.15 67.94
Single Atmosphere Suit, Bell or Submersible Pilot	
	L&M IAF
A1404 Diver (working) ***See note on last page	82.45 9.78 14.56 0.70 0.10 0.15 107.74
	L&M IAF
A1405 Diver (standby) ***See note on last page	42.65 9.78 14.56 0.70 0.10 0.15 67.94
	L&M IAF
A1406 Dive Tender ***See note on last page	41.65 9.78 14.56 0.70 0.10 0.15 66.94

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;

Class Code Classification of Laborers & Mechanics	BHR H&W PEN TRN Other Benefits THR
Piledrivers	
**See note on last page if remote site	
A1407 Welder (American Welding Society, Certified Welding Inspector)	L&M IAF 43.90 9.78 14.56 0.70 0.10 0.15 69.19
Plumbers, Region I (North of N63 latitude)	
N1501 Journeyman Pipefitter	L&M S&L 40.91 8.25 15.75 1.25 1.10 67.26
Plumber Welder	
Plumbers, Region II (South of N63 latitude)	
S1501 Journeyman Pipefitter	L&M 39.00 9.58 13.87 1.25 0.20 63.90
Plumber Welder	
Plumbers, Region IIA (1st Judicial District)	
X1501 Journeyman Pipefitter	L&M 38.02 13.37 11.25 2.50 0.24 65.38
Plumber Welder	
Power Equipment Operators	
**See note on last page if remote site	
A1601 Group I, including:	L&M 40.28 9.30 12.25 1.00 0.10 62.93
Asphalt Roller: Breakdown, Intermediate, and Finish Back Filler Barrier Machine (Zipper) Beltcrete with Power Pack & similar conveyors Bending Machine Boat Coxswain Bulldozer Cableways, Highlines & Cablecars Cleaning Machine Coating Machine Concrete Hydro Blaster	

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

**See note on last page if remote site						
					L&M	
501 Group I, including:	40.28	9.30	12.25	1.00	0.10	62.9
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						
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)						
Licensed Line & Grade						
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						
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)						
Service Oiler/Service Engineer						
Shot Blast Machine						

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

Code Classification of Laborer's & Michanles					
Power Equipment Operators					
**See note on last page if remote site					
				L&M	
1601 Group I, including:	40.28 9	.30 12.2	1.00	0.10	62.9
Shovels, Backhoes, Excavators with all attachments, and Gradealls (3					
yards & under)					
Sideboom (under 45 tons)					
Spreaders Topside (Asphalt Paver, Slurry machine, and similar types)					
Sub Grader (Gurries, Reclaimer & similar types)					
Tack Tractor					
Truck Mounted Concrete Pump, Conveyor/Tele-belt, & Creter					
Unlicensed Off-Road Hauler					
Wate Kote Machine					
				L&M	
1602 Group IA, including:	42.04 9	.30 12.2	1.00	0.10	64.6
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, Roto-Mill/Profiler (finish: when finishing to final grade and/or to hubs, or for asphalt)					
Power Plants (1000 k.w. & over)					
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					
				L&M	
1603 Group II, including:	39.51 9	.30 12.2	1.00	0.10	62.1
Boiler - Fireman					
Cement Hogs & Concrete Pump Operator					
Conveyors (except those listed in Group I)					
Grade Checker					
Hoists on Steel Erection, Towermobiles & Air Tuggers					
Horizontal/Directional Drill Locator					
Licensed Grade Technician					
Locomotives, Rod & Geared Engines					
Mixers					
Screening, Washing Plant					
Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancemen	t fund; LEG=1	egal fund:	L&M=lab	or/management fui	nd;

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

Power Equipment Operators **See note on last page if remote site		
See hole on last page if femole site		
1603 Group II, including:	L&M 39.51 9.30 12.25 1.00 0.10	62.
Sideboom (cradling rock drill, regardless of size)		
Skidder		
Trenching Machines (under 16 inches)		
Water/Waste Water Treatment Operator		
	L&M	
1604 Group III, including:	38.79 9.30 12.25 1.00 0.10	61.
"A" Frame Trucks, Deck Winches		
Bombardier (tack or tow rig)		
Boring Machine		
Brooms, Power		
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	
1605 Group IV, including:	32.58 9.30 12.25 1.00 0.10	55.

Crane Assistant Engineer/Rig Oiler Drill Helper

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 PE	N TR	N Other 1	Benefits	s THF
Power	P Equipment Operators					
*	**See note on last page if remote site					
				L&M		
1605	Group IV, including:	32.58 9.30 12.	25 1.00	0.10		55.2
	Parts & Equipment Coordinator					
	Spotter					
	Steam Cleaner					
	Swamper (on trenching machines or shovel type equipment)					
Roofer	rs					
*	**See note on last page if remote site					
				L&M		
1701	Roofer & Waterproofer	44.62 11.75 2.9	91 0.82		0.03	60.2
				L&M		
		31.23 11.75 2.9	91 0.82		0.03	46.8
	Roofer Material Handler Metal Workers, Region I (North of N63 latitude)			L&M		
Sheet I		47.74 10.80 11.	25 1.45	L&M 5 0.12		71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) Sheet Metal Journeyman	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) Sheet Metal Journeyman Air Balancing and duct cleaning of HVAC systems	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) Sheet Metal Journeyman	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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	47.74 10.80 11.	<u>25 1.4</u> 5			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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 Manufacture, fabrication assembly, installation and alteration of all	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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 sheet metal lagging Fabrication and installation of stainless steel commercial or industrial food service equipment Manufacture, fabrication assembly, installation and alteration of all ferrous and nonferrous metal work	47.74 10.80 11.	<u>25 1.4</u> 5			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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 stainless steel commercial or industrial food service equipment 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	47.74 10.80 11.	25 1.45			71.3
Sheet I	Metal Workers, Region I (North of N63 latitude) 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 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	47.74 10.80 11.	25 1.45			71.3

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

Sheet Metal Workers, Region II (South of N63 latitude) L&M S1801 Sheet Metal Journeyman 42.00 10.80 12.61 1.43 0.40 67.24 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 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** L&M 46.00 9.17 13.65 0.47 0.25 A1901 Sprinkler Fitter 69.54

Surveyors **See note on last page if remote site	
	L&M
A2001 Chief of Parties	42.81 10.58 11.39 1.15 0.10 66.03
	L&M
A2002 Party Chief	41.22 10.58 11.39 1.15 0.10 64.44
	L&M
A2003 Line & Grade Technician/Office Technician	40.62 10.58 11.39 1.15 0.10 63.84
	L&M
A2004 Associate Party Chief (including Instrument Perso	on & Head Chain Person) 38.50 10.58 11.39 1.15 0.10 61.72
	L&M
A2005 Stake Hop/Grademan	38.50 10.58 11.39 1.15 0.10 61.72

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;

Class Code	Classification of Laborers & Mechanics	BHR H&W PEN	TRN	Other Ben	efits THR
<mark>urvey</mark>	ors				
*	*See note on last page if remote site				
2006	Chain Person (for crews with more than 2 people)	24 16 10 58 11 20	1 1 5	L&M 0.10	57.3
2000	Chain Person (for crews with more than 2 people)	34.16 10.58 11.39	1.13	0.10	57.5
ruck	Drivers				
*	*See note on last page if remote site				
				L&M	
A2101	Group I, including:	39.59 10.58 11.39	1.15	0.10	62.8
	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 rockbuggy, side dump, belly dump, & trucks with pups) over 40 yards up to & including 60 yards				
	Helicopter Transporter				
	Liquid Vac Truck/Super Vac Truck				
	Material Coordinator and Purchasing Agent				
	Ready-mix (over 12 yards up to & including 15 yards) (over 15 yards to				
	be negotiated)				
	Semi with Double Box Mixer				
	Tireman, Heavy Duty/Fueler				
	Water Wagon (250 Bbls and above)			TONE	
A2102	Group 1A including:	40.86 10.58 11.39	1.15	L&M 0.10	64.0
	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, 9 axles, up to &				
	including 12 axles (over 12 axles or 150 tons to be negotiated)				
				L&M	
A2103	Group II, including:	38.33 10.58 11.39	1.15	0.10	61.5
	All Deltas, Commanders, Rollagons, & similar equipment				
	Boom Truck/Knuckle Truck (over 5 tons)				
	Cacasco Truck/Heat Stress Truck				
	Construction and Material Safety Technician				
	Dump Trucks (including 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)				
	Lowboys (including attached trailers & jeeps up to & including 8 axles)				
	benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement N=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LE0 VAC=vacation				

VAC=vacation

Truck Drivers

	**See note on last page if remote site				
2102	Group II including:	38.33 10.58 11.39 1	15	L&M 0.10	61
2103	Group II, including:	38.33 10.38 11.39 1	.13	0.10	61
	Mechanics				
	Partsman				
	Ready-mix (up to & including 12 yards)				
	Stringing Truck				
	Turn-O-Wagon or DW-10 (not self loading)				
		27 51 10 50 11 20 1	1.7	L&M	C 0
2104	Group III, including:	37.51 10.58 11.39 1	.15	0.10	60
	Batch Trucks (8 yards & up)				
	Boom Truck/Knuckle Truck (up to & including 5 tons)				
	Dump Trucks (including 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				
	Oil Distributor Driver				
	Thermal Plastic Layout Technician				
	Traffic Control Technician				
	Trucks/Jeeps (push or pull)				
				L&M	
2105	Group IV, including:	36.93 10.58 11.39 1	.15	0.10	60
	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)				
	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				
	Foam Distributor Truck Dual Axle				
	Foam Distributor Truck Dual Axle Front End Loader with Fork				

age 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

Code	Classification of Laborers & Mechanics	BHR H&W	PEN	TRN	Other Bo	enefits	THR
ruck D	Privers						
**	See note on last page if remote site						
A2105 (Group IV, including:	36.93 10.58	11.39	1.15	L&M 0.10		60.1
]	Loadmaster (air & water operations)						
	Lumber Carrier						
]	Ready-mix, (up to & including 7 yards)						
	Rigger (air/water/oilfield)						
	Semi or Truck & Trailer						
r	Fireman, Light Duty						
r	Frack Truck Equipment						
r	Fruck Vacuum Sweeper						
1	Warehouseperson						
,	Water Truck (Below 250 Bbls)						
,	Water Truck (straight)						
•	Water Wagon, Semi						
					L&M		
2106	Group V, including:	36.17 10.58	11.39	1.15	0.10		59.3
]	Batch Truck (up to & including 7 yards)						
]	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 Seeders, Single axle						
]	Pickups (pilot cars & all light-duty vehicles)						
]	Rigger/Swamper						
r	Fack Truck						
r	Feam Drivers (horses, mules, & similar equipment)						
unnel `	Workers, Laborers (The Alaska areas north of N63 latitude a	nd east of W13	<mark>88 Ion</mark>	gitud	e)		
**	See note on last page if remote site						
1 2201 (Group I, including:	33.61 8.21	17.06	1 25	L&M 0.20	LEG 0.20	60.5

Brakeman Mucker Nipper

Class

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 CodeClassification of Laborers & Mechanics

** See note on last name if remote site							
**See note on last page if remote site							
2201 Group I, including:	33.61	8.21	17.06	1.25	L&M 0.20	LEG 0.20	60.5
Storm Water Pollution Protection Plan Worker (SWPPP Worker - erosion and sediment control Laborer) Topman & Bull Gang							
Tunnel Track Laborer					L&M	LEG	
2202 Group II, including:	34.71	8.21	17.06	1.25	0.20	0.20	61.6
Burning & Cutting Torch Certified Erosion Sediment Control Lead (CESCL Laborer) Concrete Laborer Jackhammer Laser Instrument Operator Nozzlemen, Pumpcrete or Shotcrete							
Pipelayer Helper							
2203 Group III, including:	35.70	8.21	17.06	1.25	L&M 0.20	LEG 0.20	62.6
Miner Retimberman							
2204 Group IIIA, including:	39.30	8.21	17.06	1.25	L&M 0.20	LEG 0.20	66.2
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) Licensed Powderman Pioneer Drilling & Drilling Off Tugger (all type drills) Pipelayer Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)							
2206 Group IIIB, including:	43.20	5.50	17.06	1.25	L&M 0.20	LEG 0.20	67.4
Federally Licensed Powderman (Responsible Person in Charge) Grade Checking (setting or transferring of grade marks, line and grade, Stake Hopper)							
unnel Workers, Laborers (The area that is south of N63 latitude and	west o	f W13	38 long	gitude)		
**See note on last page if remote site							
2201 Group I, including:	33.61	8.21	17.06	1.25	L&M 0.20	LEG 0.20	60.5
Brakeman							
Wage benefits key: BHR=basic hourly rate; H&W=health and welfare; IAF=industry advancement PEN=pension fund; SAF=safety; SUI=supplemental unemployment insurance; S&L=SUI & LE							;

Classification of Laborers & Mechanics Code

**See note on last page if remote site							
2201 Group I, including:	33.61 8	8.21	17.06	1.25	L&M 0.20	LEG 0.20	60.
Mucker							
Nipper							
Storm Water Pollution Protection Plan Worker (SWPPP Worker - erosion and sediment control Laborer)							
Topman & Bull Gang							
Tunnel Track Laborer							
					L&M	LEG	
202 Group II, including:	34.71 8	8.21	17.06	1.25	0.20	0.20	61
Burning & Cutting Torch							
Certified Erosion Sediment Control Lead (CESCL Laborer)							
Concrete Laborer							
Jackhammer							
Laser Instrument Operator							
Nozzlemen, Pumpcrete or Shotcrete							
Pipelayer Helper							
					L&M		
2203 Group III, including:	35.70 8	3.21	17.06	1.25	0.20	0.20	62
Miner							
Retimberman							
					L&M		
2204 Group IIIA, including:	39.30 8	8.21	17.06	1.25	0.20	0.20	66
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)							
Licensed Powderman							
Pioneer Drilling & Drilling Off Tugger (all type drills)							
Pipelayer							
Storm Water Pollution Protection Plan Specialist (SWPPP Specialist)							
	12.20	0	17.06	1.05	L&M		~
206 Group IIIB, including:	43.20 5	5.50	17.06	1.25	0.20	0.20	6
Federally Licensed Powderman (Responsible Person in Charge)							
Grade Checking (setting or transferring of grade marks, line and grade, Stake Hopper)							
unnel Workers, Power Equipment Operators							

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 Benefits THR

Tunnel Workers, Power Equipment Operators	
**See note on last page if remote site	
	L&M
A2207 Group I	44.31 9.30 12.25 1.00 0.10 66.96
	L&M
A2208 Group IA	46.24 9.30 12.25 1.00 0.10 68.89
	L&M
A2209 Group II	43.46 9.30 12.25 1.00 0.10 66.11
	L&M
A2210 Group III	42.67 9.30 12.25 1.00 0.10 65.32
	L&M
A2211 Group IV	35.84 9.30 12.25 1.00 0.10 58.49

* A remote site is isolated and relatively distant from the amenities of civilization, and usually far from the employee's home. As a condition of employment, the workers must eat, sleep, and socialize at the worksite and remain there for extended periods.

** This classification must receive board and lodging under certain conditions. A per diem option of \$75 is an alternative to providing meals and lodging. See Page v for an explanation.

*** 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.

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

SECTION 00800 DRAWING INDEX

Drawing	Description
Cover page	
M1.0	Mechanical Demolition, Remodel, and Legends
E0.1	Electrical Legend, Load Calculations, and Panel Schedule
E0.2	Electrical One-Line Diagrams
E1.1	Electrical Demolition Plan
E2.1	Electrical Remodel Plan
E2.2	Enlarged Electrical Plans
E3.1	Electrical Details

SECTION 01 10 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Work Covered by Contract Documents and Work by Others
- B. Parking/Staging
- C. Work Plan and Use of Premises
- D. Hours of Operation
- E. Coordination
- F. Work Restrictions

1.02 RELATED REQUIREMENTS

- A. Document 00700 General Conditions: Provisions for use of site, and Using Agency occupancy. Relations of Contractor-Subcontractor.
- B. Document 00800 Supplementary Conditions: Modifications to General Conditions.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. Basic Bid– the Work of the Basic Bid includes replacing the existing interior generator with a new exterior generator which can support the entire building demand load, and updating the existing distribution system to accommodate the new generator.
- B. The Department is acting for the State of Alaska.

1.04 CONTRACT METHOD

- A. Construct the Work under a single lump sum contract.
- B. Substantial Completion of the Work will be phased according to the requirements of this section and as provided in the General and Supplementary Conditions and as established on Form 25D-9.

1.05 WORK BY OTHERS

A. The CONTRACTOR shall cooperate with other contractors and the DEPARTMENT to minimize conflict between the construction Work of this contract and others.

1.06 LOCAL CONDITIONS

A. Bidders shall familiarize themselves with the Contract Documents and existing conditions, which affect Work, required by the Contract Documents. It will be assumed that bidders have made a personal examination of the jobsite, existing

conditions, and documents for prior construction projects associated with this facility made available by the Owner for review by Bidders during the bid period.

- B. Failure to visit the jobsite, to review existing conditions, or to review documents for prior construction projects associated with this facility made available by the Owner for review by Bidders during the bid period will in no way relieve the successful Bidder of the necessity of furnishing any materials or performing any Work that may be required to complete the Work in accordance with the Contract Documents with no additional cost to the Owner.
- C. For building and facility access, please contact Andy Carie, 907-458-2227.

1.07 PARKING AND STAGING

A. Contractor staging area shall be coordinated with the Department and shall be approved prior to mobilization to the project site.

1.08 WORK PLANS AND ACCESS TO FACILITY, INDIVIDUAL WORK AREAS

- A. Sequence the work as required to minimize disruption and allow for continuous occupancy.
- B. No construction operations affecting safety or comfort of the public or of building occupants shall begin until the work area is appropriately segregated.
- C. Provide detailed written work plan with drawing(s) of each area impacted by the Contractor's work. The work plan shall be broken out into phases to localize impact of construction activities. Show limits of work enclosures, barricades, temporary partitions, or other items affecting the operation of the area. Work plan shall include a schedule for each major activity or trade.
- D. Prior to beginning work or a new phase of work identified in the work plan, the Contractor shall notify the Department Project Engineer in writing at least 5 (five) working days, not including weekends or Holidays.
- E. The Contractor shall be responsible for ground snow removal within any staging area. Coordinate with Department for removal of snow outside of staging areas, and from areas not adequately address by normal operations.

1.09 SHUTOFFS / DISRUPTIONS TO SERVICE

- A. Provide written notification of work that will disrupt any operational system at Pioneer Home at least five working days (not including weekends) in advance.
- B. Plan work to minimize down time. Work with Department to schedule disruption for a time that minimizes impact on Pioneer Home operations.
 - 1. The Pioneer Home is a medical facility, with a need for continuous supply of electrical power for priority systems. The maximum length of time for power to be shut down is expected to be no more than 30 minutes.
- C. A phasing schedule is to be furnished and approved by DEPARTMENT regarding the change-over between the existing backup generator and the new

backup generator. A backup power source generator is to be available through the entire project duration, to include the use of a portable stand-by generator as required.

1.10 HOURS OF OPERATION

- A. Construction operations may occur at any hour, any day. It is preferred that work within the facility to be conducted between the hours of 8:00 am to 5:00 pm, Monday through Saturday, unless specifically approved by the Maintenance Supervisor.
- B. Construction operations must otherwise comply with all limits and constraints for specific Work as required by the Contract Documents.

1.11 CONTRACTOR'S USE OF PREMISES

- A. Coordinate use of premises under direction of Department.
- B. Assume full responsibility for protection and safekeeping of products under this Contract.
- C. Assume full responsibility for the protection of the existing Pioneer Home buildings and their contents.
- D. Obtain and pay for use of additional storage or Work areas needed for operations under this Contract.
- E. Do not stop or otherwise impede traffic without prior written approval from the Department.
- F. Within the Contract Limits or staging area, maintain clear access to egress routes including corridors and entrance/egress doors at all times where spaces are occupied during the Work. Maintain clear access to operational elements for continued use and service as required unless otherwise approved in writing by the Department.

1.12 USING AGENCY OCCUPANCY

- A. Using Agency shall occupy the project throughout the entire construction period. Coordinate with Department in scheduling operations to minimize conflict and to facilitate operations.
- B. Contractor shall provide Material Safety Data Sheets for all products used in the project that may impact occupied work space (i.e., odors, etc).

1.13 COORDINATION

- A. Coordinate Work of the various sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
- B. Verify if characteristics of elements of interrelated operating equipment are compatible; coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such

equipment.

1.14 WORK RESTRICTIONS

- A. Items in the project limits that are not depicted in the Drawings, or that are not designated in the Contract Documents for CONTRACTOR removal, will be removed by the Department prior to the start of on-site work. This will generally be limited to items stored or used for maintenance in the area but that are not components of operational building systems.
- B. Appropriate temporary barriers shall be installed to isolate areas of construction operations from occupied spaces or public areas.
 - 1. Barriers shall provide for safe passage around and through the work site as needed for continued operations.
 - 2. Barriers shall protect adjacent occupied spaces from noticeable dust, fumes or other objectionable by-product of construction activity.
 - 3. Coordinate with section 01 50 00, Construction Facilities & Temporary Controls and 01 30 00, Administrative Requirements when a work sequence plan is required.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 12 19

CONTRACTOR'S CERTIFICATION OF SUBCONTRACTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procedures for preparing, submitting and accepting subcontracts.

1.02 RELATED REQUIREMENTS

- A. Document 00100 Instructions to Bidders, Requirements of Apparent Low Bidder
- B. Document 00430 Subcontractor List
- C. Document 00700 General Conditions: Paragraph 6.13.1, Subcontractor Certification and Approval
- D. Section 01 30 00 Administrative Requirements: Submittals

1.03 PREPARATION OF CERTIFICATION

- A. Certification Forms: Use only forms provided by Department.
- B. CONTRACTOR to prepare certification form in accordance with the instructions on the reverse side of form. Multiple subcontracts may be included under a single submittal. Where required, attach additional information -- cross referenced to the appropriate Subcontract -- to the certification form.
- C. Substitute certification forms will not be considered.

1.04 SUBMITTAL OF CERTIFICATION

A. CONTRACTOR shall submit the initial and all subsequent certification form(s) in accordance with the submittal requirements identified under paragraph 1.02.D, previous.

1.05 CONSIDERATION OF CERTIFICATION

- A. Following receipt of submittal and within a reasonable period of time Department shall review for each of the following:
 - 1. Completeness of forms and attachments
 - 2. Proper execution (signatures) of forms and attachments
- B. Submittals which are not complete or not properly executed will be returned to the CONTRACTOR under a transmittal letter denoting the deficiencies found. CONTRACTOR shall correct and resubmit in accordance with Contract requirements.
- C. SUBCONTRACTORS WHICH HAVE NOT BEEN APPROVED BY THE DEPARTMENT SHALL NOT BE ALLOWED ON SITE.
- D. Payment will not be made for work performed by a non-certified subcontractor.

1.06 ACKNOWLEDGEMENT OF CERTIFICATION

A. Submittals which have been examined by the Department and are determined to be complete and properly executed shall be acknowledged as such by the Department's Project Manager on the approval line of the certification form.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

STATE OF ALASKA DOT & PF STATEWIDE PUBLIC FACILITIES

SUBCONTRACTOR CERTIFICATION

Note: The Contractor shall provide this form for <u>ALL</u> subcontractors working on this project. This form is applicable to all projects, including Small Procurement Contracts, and must be completed in full.

PRO	JECT:	PROJ. #:				
PRIN	ME CONTRACTOR:					
	suant to the Contract Documents, we hereby stip ast Subcontractor on the following list:	pulate the following concern	ing the award o	of Work to		
1.	First Tier Subcontractor:	DBE?	Yes	No		
	Second Tier:	DBE?	Yes	No		
	Third Tier:	DBE?	Yes	No		
	Fourth Tier:	DBE?	Yes	No		
2.	Date of Subcontract:					
3.	Amount of Subcontract: \$					
4.	Scope of Work:					
5.	Are the following documents kept on file by appropriate answer)?	both the Contractor and the	Subcontractor	(check the		
	EEO-1 Certification (Form 25A304), federall Contract Minimum Wage Schedule Civil Rights Representative (Form 25A302)	y funded projects only	Yes Yes Yes	No No No		
6.	Does the Subcontract contain provisions for on late payment and retainage conforming to		of retainage, ar Yes	nd interest No		
7.	Does the Subcontract specifically bind the S of the Contract Documents for the bene provisions and termination provisions as req	fit of the Department and	does it conta			
	F		Yes	No		
8.	a. Does the Subcontractor have adequate Documents?	e insurance coverages as s	specified in the	e Contract		
	Documents:		Yes	No		
	If not, does the Contractor stipulate that the ins Contractor and that he has notified his insurance			able to the		
			Yes	No		
	 b. Does the evidence of insurance certify aspects of the insurance requirements for th 					
	a Door the ovidence of incurrence list the	Dopartment as an "Addition	Yes	No Cortificato		
	c. Does the evidence of insurance list the Holder"?		Yes			

REV 10/16

BLDG-FORM 05

PROJECT: PROJ. #:			
Subc	contractor Name:		
	d. Does the evidence of insurance commit to policy provisions before cancellation or reduct liability?		
		Yes	No
	e. Insurance Expiration dates: Comprehensive or Commercial Genera	I Liability:	
	Automobile: W	orkers' Compensation:	
	(Other):		
9.	Does the Contractor certify firms or individuals of FHWA are not employed or subcontracted under t		FAA, or
		Yes	No
10.	Copies of the following professional certifications that apply):	s, licenses, and registrations are attached ((circle all
	Business License (mandatory) Contractor License (mandatory) Land Surveyor's License Electrical Administrator's License (man Mechanical Administrator's License (ma Engineer/Architect Other:	andatory for mechanical subs)	
11.	Exceptions to any of the above are explained as f	ollows:	
	RTIFICATION (to be completed and signed by P rue and correct.	RIME CONTRACTOR): I certify all the a	above to
Signa	nature:		
Printe	ted Name:		
Comp	npany:		
Date:	9:		
	DEPARTMENT'S APPRO	VAL/DISAPPROVAL	
Prime	subject subcontract is APPROVED . Nothing in the Contractor of the responsibility for complete perf Department to reject defective work.		
SIGN	NATURE:	DATE:	
	Project Engineer		
The s	subject subcontract is NOT APPROVED for the foll	owing reasons:	

_

_

Project Engineer DATE:

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procedures for processing Change Orders.

1.02 RELATED REQUIREMENTS

- A. Document 00312 Bid Schedule: Total amount bid for lump sum items
- B. Document 00510 Contract Form: Total amount of Contract Price, as awarded
- C. Document 00700 General Conditions: Governing requirements for changes in the Work, in Contract Price, and Contract Time.
- D. Section 01 29 00 Payment Procedures.
- E. Section 01 30 00 Administrative Requirements.
- F. Section 01 60 00 Product Requirements
- G. Section 01 77 00 Closeout Procedures; Project Record Documents.

1.03 SUBMITTALS

- A. Submit name of the individual authorized to accept changes, and to be responsible for informing others in CONTRACTOR's employ of changes in the Work.
- B. Change Order Forms will be prepared by the Department.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done on a Cost of the Work plus a Fee basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work. Incomplete or unsubstantiated costs will be disallowed.
- B. CONTRACTOR shall submit a complete, detailed, itemized cost breakdown addressing impact on Contract Time and Contract Price with each proposal.
- C. On request, provide additional data to support computations:
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance and bonds.
 - 3. Overhead and profit.
 - 4. Justification for any change in Contract Time.

- 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a cost of the Work plus a Fee basis, with additional information:
 - 1. Origin and date of claim.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time records and wage rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.05 PRELIMINARY PROCEDURES

- A. Department may submit a Proposal Request which includes: Detailed description of change with supplementary or revised Drawings and Specifications, the projected time for executing the change, with a stipulation of any overtime work required, and the period of time during which the requested price will be considered valid.
- B. CONTRACTOR may initiate a change by submittal of a request to Department describing the proposed change with a statement of the reason for the change, and the effect on Contract Price and Contract Time with full documentation.

1.06 CONSTRUCTION CHANGE AUTHORIZATION

A. Shall be in accordance with Article 9 - Changes: in Document 00700 - General Conditions.

1.07 LUMP SUM CHANGE ORDER

- A. Will be based on proposal request and CONTRACTOR's lump sum quotation or CONTRACTOR's request for Change Order as approved by the Department.
- B. CONTRACTOR shall submit an itemized price proposal in sufficient detail to fully explain the basis for the proposal. Attach invoices and receipts for products, equipment, subcontracts, and other elements as requested by the Department. CONTRACTOR and Department shall then negotiate an equitable price (and time adjustment if appropriate) in good faith. The Change Order will reflect the results of those negotiations. If negotiations do not result in a mutually agreeable price, CONTRACTOR may be directed to perform the work under Cost of the Work plus a Fee basis.
- C. The maximum rates of cost markup (to include, but not be limited to, both overhead and profit of the CONTRACTOR) shall be as provided in Section 00700
 General Conditions of the Construction Contract for Buildings and with any modifications to that document under Section 00800 Supplementary Conditions.

D. These terms shall also apply to the proposal of subcontractors and allowances.

1.08 UNIT PRICE CHANGE ORDER

- A. For pre-determined Unit Prices and quantities, Change Order will be executed on a lump sum basis.
- B. For unit costs or quantities of units of Work, which are not predetermined, execute Work under a Directive. Changes in Contract Price or Contract Time will be computed as specified for cost of the Work plus a Fee by Change Order.

1.09 COST OF THE WORK CHANGE ORDER

- A. CONTRACTOR shall submit documentation required in the Contract on a daily basis for certification by the Project Engineer. The Project Engineer will indicate by signature that the submitted documentation is acceptable.
- B. After completion of the change and within 14 Calendar Days, unless extended by the Project Manager, the CONTRACTOR shall submit in final form an itemized account with support data of all costs. Support data shall have been certified by the Project Manager, as required above in paragraph A.
- C. The maximum rates of cost markup (to include, but not be limited to, both overhead and profit of the Contractor) shall be used for Cost of the Work Change Orders as provided in Section 00700 General Conditions of the Construction Contract for Buildings and with any modifications to that document under Section 00800 Supplementary Conditions.

1.10 EXECUTION OF CHANGE ORDERS

A. Department will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price as shown on Change Order.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
- C. Promptly enter changes in project record documents.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procedures for preparation and submittal of Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. Document 00510 Construction Contract Contract Form 25D-10a and Bid Schedule: Method of Payment and Contract Price and Amounts of Liquidated Damages.
- B. Document 00700 General Conditions: Progress Payments, and Final Payment.
- C. Section 01 30 00 Administrative Requirements: Schedule of Values.
- D. Section 01 77 00 Closeout Procedures.

1.03 FORMAT

A. Application for Payment form in format approved by the Department.

1.04 PREPARATION OF APPLICATIONS

- A. Type required information on Application for Payment form approved by Department.
- B. Execute certification by original signature of authorized officer upon each copy of the Application for Payment.
- C. Submit names of individuals authorized to be responsible for information submitted on application for payment.
- D. Indicate breakdown of costs for each item of the Work on accepted schedule of values. Provide dollar value in each column for each line item for portion of Work performed and for stored materials.
- E. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.
- F. Prepare Application for Final Payment as specified in Section 01700.

1.05 SUBMITTAL PROCEDURES

- A. Submit two copies of each Application for Payment at times stipulated in Contract.
- B. Submit under transmittal letter specified in Section 01 30 00. Identify contract by Department contract number.

1.06 SUBSTANTIATING DATA

- A. Substantiating data shall be provided with all pay estimates and shall include be accompanied with the Department provided Time & Materials worksheets for each Work day.
- B. When Department requires additional substantiating information, submit data justifying line item amounts in question.
- C. Provide one copy of data with cover letter for each copy of Application. Show Application number and date, and line item by number and description.

1.07 SUBMITTALS WITH APPLICATION FOR PAYMENT

- A. Submit the following with each Application for Payment.
 - 1. Updated construction schedule as required by Section 01 30 00 -Administrative Requirements: Construction Progress Schedule.
 - 2. Updated Schedule of Values as required by Section 01 30 00 Administrative Requirements: Schedule of Values.
 - 3. The CONTRACTOR's Record Document updates may be reviewed by the Department prior to approving each application for payment. If updates are needed, approval of the application for payment may be delayed.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION

SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Project Management and Coordination.
- B. Schedule of Values
- C. Project Meetings.
- D. Construction Progress Documentation.
- E. Submittals.

1.02 RELATED REQUIREMENTS

- A. Section 00700 General Conditions of the Construction Contract: Article 6 -Contractor Responsibilities
- B. Section 01 10 00 Summary of Work.
- C. Section 01 29 00 Payment Procedures: Submittal of Applications.
- D. Section 01 40 00 Quality Requirements.
- E. Section 01 60 00 Product Requirements: Contractor's list of Products.
- F. Section 01 77 00 Closeout Procedures
- G. Section 01 78 00 Closeout Submittals

1.03 PROJECT MANAGMENT AND COORDINATION

- A. Project Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Pre-installation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.

1.04 SCHEDULE OF VALUES

- A. Submittals: Within 14 calendar days after the date of the Notice to Proceed, submit for approval by the Contracting Officer, a Schedule of Values which subdivides the Work into component parts, the sum of which is the aggregated Contract Price.
 - 1. If the Schedule of Values requires revision after review, submit revised schedule within 10 days of receipt of revisions comments.
 - 2. Include written certification that prices include an appropriate amount of overhead and profit applicable to each line item subdivision.
- B. Format: The form and content of the Schedule of Values must be acceptable to Department. The Contractor's standard form or media-driven printout will be considered on request.

- C. Content: List the installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for progress payments. Round off values to the nearest dollar.
 - 1. For each major subcontract, list products and operations of that subcontract as separate line items. This may extend to tiers below mechanical and electrical subcontractors.
 - 2. Coordinate line items with the Construction Progress Schedule for close alignment.
 - 3. For items on which payments will be requested for stored products, list sub-values for cost of stored products with taxes paid.
 - 4. Include a separate line item for Contract Closeout requirements the minimum value of which shall be listed at a minimum of \$10,000. No progress payments will be made against this line item until all submittals have been received and accepted by the Department.

1.05. PROJECT MEETINGS

- A. Preconstruction Meeting: The Department will schedule and administer a pre-construction conference for the execution of documents required by the Contract and for exchange of preliminary submittals. The meeting will be held at the project site or another location convenient to the parties.
 - 1. Attendees Required: Authorized representatives of the Department, the Fairbanks Pioneer Home including the project sponsor and the site maintenance manager, the Architect/Engineer, and the Contractor's project manager and superintendent.
 - 2. Alternate Attendees: As required by the complexity of the Work, and at the discretion of the Project Manager, the Architect/Engineer's consultants, and the Contractor's major subcontractors/suppliers. All parties at the meeting shall be familiar with the Project and authorized to conclude matter relating to the Work within their delegation.
 - 3. Agenda:
 - a. Submission of executed bonds and insurance certificates.
 - b. Distribution of Contract Documents.
 - c. Submission of list of Subcontractors, list of products, Schedule of Values, and Construction Progress Schedule.
 - d. Designation of personnel representing the parties to the Contract.
 - e. Contracting Officer delegations.
 - f. Procedures and processing of field decisions, submittals,

substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

- g. Security requirements.
- h. Use of the premises.
- i. Scheduling.
- 4. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to the Department's Project Engineer, meeting participants, and entities affected by decisions made.
- B. Site Mobilization Meeting: The Department will schedule and administer a site mobilization conference at the Project Site prior to the commencement of construction activity on-site. The conference will be to clarify the Contractor's use of the site and for coordination with the using agency for occupancy as required under the Contract. Contractor shall provide any required Work Plans in preparation for this meeting.
 - 1. Attendees Required: Authorized representatives of the Department, the Pioneer Home including the project sponsor and facility user, the Architect/Engineer, and the Contractor's superintendent, the Contractor's major subcontractors/suppliers.
 - 2. Agenda:
 - a. Use of premises by Pioneer Home and Contractor.
 - b. Pioneer Home's requirements and occupancy prior to completion.
 - c. Construction facilities and controls provided by Pioneer Home.
 - d. Temporary utilities provided by Pioneer HOme.
 - e. Survey and building layout.
 - f. Security and housekeeping procedures.
 - g. Schedules.
 - h. Application for payment procedures.
 - i. Procedures for testing.
 - j. Procedures for maintaining record documents.
 - k. Requirements for start-up of equipment.
 - I. Inspection and acceptance of equipment put into service during construction period.
 - 3. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to the Department's Project

Engineer, meeting participants, and entities affected by decisions made.

- C. Progress Meetings: The Contractor shall schedule and administer meetings to review the progress of the Work at weekly intervals (unless otherwise approved by the Department's Project Manager) and other meetings as required to coordinate the Work, including any pre-installation conferences.
 - 1. Duties: Make arrangements for meetings, prepare agenda and distribute to participants at least 48 hours in advance of the meeting, provide copies of agenda for participants, preside at meetings.
 - 2. Attendees Required: Contractor's superintendent and major subcontractors/suppliers, authorized representatives of the Department, the Pioneer Home maintenance manager, the facility user, and the Architect/Engineer as appropriate to agenda topics for each meeting.
 - 3. Agenda: Review and approve or correct minutes of previous meeting(s). Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Work including:
 - a. Construction Progress Schedule: Review progress since the last meeting. Report whether each activity is on time, ahead of schedule, or behind schedule. Discuss Contractor's plans to resolve any work behind schedule; secure commitments from parties involved to do so.
 - b. Review progress for the next period.
 - c. Field observations, problems, and decisions.
 - d. Identification of problems that impede, or will impede, planned progress.
 - e. Review of submittals schedule and status of submittals.
 - f. Review of RFIs and their status.
 - g. Status of proposal requests.
 - h. Pending changes
 - i. Status of Change Orders
 - j. Maintenance of quality and work standards.
 - k. Documentation and status for Applications for Payment
 - I. Other business relating to Work.
 - 4. Contractor to record minutes and distribute copies within two days after meeting to participants, with electronic copies to the Department's Project Engineer, meeting participants, and entities affected by decisions made.

- D. Pre-installation Conferences: When required in an individual Specification section, or when directed by the Department, convene a pre-installation conference prior to commencing Work in that section or directive.
 - 1. Duties: Make arrangements for meetings, prepare information, and distribute to participants at least 48 hours in advance of the meeting, provide copies of review information for participants, conduct meetings.
 - 2. Attendees Required: Installer and representatives of manufacturer's and fabricators involved in, or affected by, the Work of the section.
 - 3. Actions: Review conditions of installation, preparation and installation procedures, and coordination with related Work.

1.06 CONSTRUCTION PROGRESS DOCUMENTATION

- A. Construction Progress Schedule(s)
 - 1. Within 14 calendar days after the date of the Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
 - 2. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
 - 3. Within 21 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - a. Include written certification that major contractors have reviewed and accepted proposed schedule.
 - 4. Within 7 days after Department review, submit final schedule.
 - 5. Submit updated schedule with each significant revision based on outcomes of Progress Meetings.
 - 6. The format of the Construction Progress Schedule shall be a horizontal bar chart (Gantt) and the content will be substantially as follows:
 - a. Separate bar for each major trade or operation, identifying the duration of each activity and precedent activities.
 - b. Complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Show each work plan and separate work area as a separate activity or group of activities.
 - c. Show projected percentages of completion for each item of the Work and each Submittal as of the time of each Application for Progress Payment. (See e. for electronic version requirements)

- d. Submit Construction Progress Schedule plotted on paper no larger than 24 by 30 inches and no smaller than 8-1/2 by 11 inches.
- e. In addition to a printed copy, provide an electronic version of the Construction Progress Schedule using Microsoft Project 2013.. Provide the file on a CD or flash drive. Electronic media will not be returned by the Department.
- f. Reference section 01 35 00 for 4D Scheduling requirements.
- B. Construction Progress Reports:
 - 1. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site. Provide in two paper copies or electronically on a weekly basis:
 - a. List of subcontractors at Project site.
 - b. Equipment at Project site.
 - c. Material deliveries.
 - d. High and low temperatures and general weather conditions.
 - e. Accidents.
 - f. Stoppages, delays, shortages, and losses.
 - g. Meter readings and similar recordings.
 - h. Orders and requests of authorities having jurisdiction.
 - i. Services connected and disconnected.
 - j. Equipment or system tests and startups.
 - 2. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Provide in two paper copies or electronically at time of discovery of differing conditions. Submit with a Request for Interpretation (RFI) on form furnished by Owner. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- C. Requests for Information (RFIs): Immediately on discovery of the need for an interpretation of the Contract Documents, and if not possible to adequately address in the Construction Progress Meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs may originate with the Contractor or the Department. RFIs submitted by subcontractors or suppliers will be returned with no response.

- 2. Format and Content: Provide a detailed, legible description of the item needing interpretation on the Department's form. Each RFI must be uniquely and sequentially numbered. Fully complete all areas of the form. Provide attachments including drawings, descriptions, photographs, measurements, product data, shop drawings, and other information necessary to fully describe the contract item.
- 3. Architect/Engineer's Action: The architect or engineer with responsible charge of the Contract Document in question will review each RFI on the behalf of the Department and will return it to the Project Manager or Project Engineer. Allow seven work days for the Architect/Engineer's response for each RFI. RFIs received after 1:00pm will be considered as received the following work day.
 - a. The following RFIs will be returned without action:
 - 1) Requests for approval of Submittals.
 - 2) Request for approvals of Substitutions.
 - Requests for coordination information already indicated in the Contract Documents.
 - 4) Requests for adjustment in Contract Time or Contract Amount.
 - 5) Requests for interpretation of Architect/Engineer's actions on Submittals.
 - 6) Substantially incomplete RFIs or RFIs with numerous errors.
 - b. Architect/Engineer's action may include a request for additional information, in which case response time will reset.
 - c. Architect/Engineer's response on RFIs that may result in a Change to the Contract Time or Contract Amount must be responded to by the Contractor in the manner prescribed for Contract Modifications.
 - d. On receipt of the RFI from the Department, update the RFI Log and immediately distribute the RFI to the affected parties. Review the response and notify the Project Manager within 7 days of receipt if in disagreement with the response.
 - e. RFI Log: Prepare, maintain and submit a tabular log or RFIs organized by RFI number. Include the project name, RFI number, RFI title, date RFI was submitted, and date Architect/Engineer's

response was received. Submit updated RFI Log with each Progress Meeting agenda.

1.07 SUBMITTALS

- A. Electronic Submittal Procedures
 - 1. Summary:
 - Shop Drawings, Installation Drawings, and Product Data submittals shall be submitted in electronic (.pdf) format using the Submittal Exchange[™] (www.submittalexchange.com) or equal pre-approved web-based service designed specifically for transmitting submittals between all construction team members.
 - b. At the CONTRACTOR's option, other project submittals required for the administration of the Project may also be transmitted using Submittal Exchange.
 - c. The electronic process is not intended for color samples, color charts, or physical material samples where required. The CONTRACTOR will use traditional parcel delivery methods for such items.
 - d. The electronic submittal service shall also be used for all other project correspondence including but not limited to: RFIs, meeting minutes, certified payroll, pay applications, RFPs, change notices, substitution requests, etc.
 - 2. Procedures:
 - a. The CONTRACTOR will create a submittal log in Submittal Exchange by inserting required submittals listed in individual specification sections.
 - b. Submittal Preparation CONTRACTOR may use any or all of the following options:

1) Subcontractors and Suppliers provide electronic (PDF) submittals to CONTRACTOR via the Submittal Exchange website.

2) Subcontractors and Suppliers provide electronic (PDF) submittals to CONTRACTOR via email.

3) Subcontractors and Suppliers provide paper submittals to a scanning service which electronically scans and converts to PDF format after which one of the above is used.

c. Printed Submittals: For shop drawings for structural framing, in addition to electronic submittals, provide two printed copies to the

Department's Project Engineer. For all other submittals, provide one paper copy delivered to the Department's Project Engineer.

- d. CONTRACTOR shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
- e. CONTRACTOR shall transmit each submittal to both the Department and to the Architect/Engineer of record using the Submittal Exchange website.
- f. Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. CONTRCTOR will receive email notice of completed review.
- g. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the CONTRACTOR.
- h. Submit paper copies of any reviewed submittals not submitted electronically at project closeout for record purposes in accordance with Section 01 78 00 Closeout Submittals.
- 3. Costs:
 - a. CONTRACTOR shall include the full cost of Submittal Exchange project subscription in their proposal. This cost is included in the Contract Amount. Contact Submittal Exchange at 1-800-714-0024 to verify cost prior to bid.
 - b. The intent is for Submittal Exchange service cost to be in lieu of postage or shipping costs typically paid for paper submittals. Service cost is a net cost savings to Contractor because submittals sent electronically do not need to be shipped physically.
 - c. After award of contract, CONTRACTOR shall arrange for training to be provided by Submittal Exchange regarding use of website and PDF submittals.
 - d. Internet Service and Software Requirements:

1) Email address and Internet access at CONTRACTOR's main office.

2) Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

4. Service Provider:

a. Basis of specification is Submittal Exchange website system for electronic construction submittals which shall provide the following minimum services:

1) Independently hosted, web-based system for automated tracking, storage, and distribution of contract submittals, Requests For Information, and other contract related documents. FTP sites, e-mail exchanges, and server-based systems hosted from inside a contractor's office will not be considered are not acceptable.

2) Utilize 256-bit SSL encryption and hosted at SSAE 16 compliant data centers.

3) Minimum five years documented experience of use on comparable commercial construction projects. "Comparable commercial construction projects" shall be defined as documented use on a minimum of five hundred governmental, public-entity, or private sector projects each of \$1 million construction value or greater.

4) Minimum five years documented 99.5% website uptime.

5) Unlimited individual user accounts and system access for all Project subcontractors, CONTRACTOR staff, Department staff, Architect, design consultants, and sub-consultants, with no additional fees for those parties to access the system.

6) Separate locations for Department, Architect, design consultant, and sub-consultant review comments with contractors restricted from viewing comments until final review or release by owner or primary design consultant.

7) Full version histories and dates of exchanges automatically tracked and available for viewing, searching, and reporting in a linear log format compatible with AIA G712.

8) Functionality to group submittals as required packages and apply forms and review comments to entire package simultaneously.

9) Functionality for integrated online PDF viewing and review, including graphical markups and stamps, for owner, architect, design consultants, sub-consultants, and general contractor without need for additional software purchase.

10) Automatic, configurable email notifications for each project

team member for new and reviewed submittals and other items.

11) Automatic, configurable email reminders of past due items.

12) Customized, automated PDF form generation for submittals, RFIs, and other documents matching standard templates used by owner, design consultants, sub-consultants, and general contractor. Documentation and demonstration of automatic form generation using each entity's templates must be submitted as part of any substitution request.

13) Prior to project start, system vendor shall create submittal log with all required items from project manual or submittal register. Owner or primary design consultant shall have full control over required items list and access to edit, add, or remove items during project.

14) System vendor shall provide minimum one-hour live web meeting training sessions to CONTRACTOR, sub-contractors, design consultants, sub-consultants, and Department staff prior to project start.

15) System vendor shall make available minimum thirty-minute live web meeting training sessions for subcontractors at least twice weekly for the entire duration of the project.

16) System vendor shall provide access for owner, design consultants, sub-consultants, general contractor, and subcontractors to live technical support by phone and email minimum of 7 AM to 6 PM CST on standard business days at no additional cost.

17) Allowance for scanning and printing services provided by local third-party reprographic vendor to assist with obtaining documents electronically and online print ordering.

18) At completion of project closeout, service provider shall provide minimum of four archival discs that include all documents and tracking logs, or the ability to download this information from the live website in a single complete archive package.

b. Substitution may be considered if submitted in accordance with Contract provisions. Alternate service providers will meet or exceed the preceding minimum requirements.

 B. General: Submit administrative submittals (e.g., Construction Progress Schedule, Schedule of Values, Submittal Schedule, Subcontractor Certifications, etc.) required in this and other Sections in accordance with provisions stated.

C. Submittal Schedule

- 1. Within 21 calendar days after the date of the Notice to Proceed, submit for approval by the Contracting Officer, a Submittal Schedule which lists the required submittals of each Specification section from Divisions 01-35.
- 2. Format: The form and content of the Submittal Schedule must be acceptable to Department and should show, in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification section number and title.
 - c. Submittal category (administrative, review, informational, close out).
 - d. Name of subcontractor.
 - e. Description of the work covered.
 - f. Scheduled date for Architect/Engineer's final release or approval.
- 3. The Submittal Schedule, when approved, will be used as the Submittal Log, as required for Progress Meetings. The following fields will be added for this purpose: transmittal date from CONTRACTOR, date received by Architect/Engineer, and date returned to CONTRACTOR.
- 4. The Submittal Schedule must be approved prior to the Contractor making any submittals unless otherwise deferred by the Project Manager.
- D. Submittals for Review
 - 1. When the following are specified in individual sections, submit them for review:
 - a. Product data.
 - b. Shop drawings.
 - c. Installation drawings.
 - d. Samples for selection.
 - e. Samples for verification.
 - 2. Submit to the Department for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 3. Samples will be reviewed only for aesthetic, color, or finish selection.
 - 4. After review, provide copies and distribute in accordance with Submittal Procedures article below and for record documents purposes described in

Section 01 78 00 - Closeout Submittals.

- D. Submittals for Information
 - 1. When the following are specified in individual sections, submit them for information:
 - a. Design data.
 - b. Certificates.
 - c. Test reports.
 - d. Inspection reports.
 - e. Manufacturer's instructions.
 - f. Manufacturer's field reports.
 - g. Other types indicated in individual sections.
 - 2. Submit for Owner's Representative's knowledge as contract administrator or for Fairbanks International Airport. No action will be taken unless submittals show non-conformance with Contract requirements.
- E. Submittals for Project Closeout
 - 1. When the following are specified in individual sections, submit them at project closeout:
 - Project record documents in accordance with General Conditions
 6.16, Supplementary General Conditions and these
 Specifications.
 - b. Operation and maintenance data.
 - c. Warranties.
 - d. Bonds.
 - e. Other types as indicated.
 - 2. Submit for Fairbanks International Airport's benefit during and after project completion.
 - 3. Submittals for Project Closeout:
 - a. For Record Documents, provide one original, master copy of each item.
 - b. For each submittal made under Submittals for Review, provide one printed copy of the returned submittal as approved
 - b. For each submittal made under Submittals for Information, provide one printed copy and one electronic copy of each item in .pdf

format on a CD.

- 4. Samples: Submit the number specified in individual specification sections; one of which will be retained by Owner's Representative.
 - a. Retained samples will not be returned to CONTRACTOR unless specifically so stated.
 - b. Department will require submittal of all required color and finish samples in order to approve any one color or finish.
 - c. After review, produce duplicates.
- G. Submittal Procedures:
 - 1. Transmit submittals in accordance with the approved Submittal Schedule and in such sequence to avoid delay in the Work.
 - 2. Transmit each submittal with a Department-approved form.
 - Sequentially number the transmittal form. If revised, number submittals with original number and a sequential numerical suffix as follows: "R1", R2", etc.
 - 4. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
 - 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
 - 6. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work. Request substitutions with the submittal on the Department's Substitution Request Form
 - 7. Schedule submittals to expedite the Project, and coordinate submission of related items. No extension of Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 8. For each Submittal for Review, allow 15 days from receipt by the designated review entity.
 - 9. Each Submittal for Review will be returned to the CONTRACTOR as a "mark-up" electronic copy in .pdf format as provided for in paragraph A of this section. Where not possible to return electronically (i.e., samples, etc.) the submittal will be mailed, courier mailed, courier delivered or hand delivered as needed to meet review time targets.

- 10. When revised for resubmission, identify all changes made since previous submission.
- 11. Duplicate and distribute reproductions of submittals which bear Architect/Engineer's stamp, to job site file, record documents file, Subcontractors, suppliers, and other entities requiring information. Instruct parties to promptly report any inability to comply with requirements indicated.
- 12. Do not fabricate products or begin Work which requires submittals until return of submittal with Department acceptance.
- 13. Submittals not requested will not be recognized or processed.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

SECTION 01 40 00

QUALITY REQUIREMENTS

1.01 REQUIREMENTS INCLUDED

- A. General Quality Control.
- B. Regulatory Requirements.
- C. References.
- D. Submittals.
- E. Quality Assurance.
- F. Quality Control.
- G. Repair and Protection.

1.02 RELATED REQUIREMENTS

- A. Document 00700 General Conditions: Inspection and testing required by governing authorities.
- B. Section 01 30 00 Administrative Requirements: Submittals
- C. Individual Specification Sections: Quality Control Requirements.

1.03 QUALITY CONTROL, GENERAL

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve CONTRACTOR of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit CONTRACTOR's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - Requirements for CONTRACTOR to provide quality-assurance and -control services required by Department or authorities having jurisdiction are not limited by provisions of this Section.
- C. Control of Installation:
 - 1. CONTRACTOR shall maintain quality control over Suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
 - 2. Comply with manufacturers' instructions, including each step in sequence.
 - 3. Comply with specified standards as minimum quality for the Work except

where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

- 4. Have Work performed by persons qualified to produce required and specified quality.
- 5. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- 6. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.
- D. Tolerances
 - 1. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
 - 2. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Department's Representative before proceeding.
 - 3. Adjust products to appropriate dimensions; position before securing products in place.
- E. See Divisions 02 through 35 Sections for specific test and inspection requirements.

1.04 REGULATORY REQUIREMENTS

- A. Comply with applicable regulatory requirements and various codes referenced in these specifications. Where conflicts exist between local, State, and/or Federal regulatory requirements, codes, or these specifications advise the Department's Representative. The Department's Representative will assist in resolving the conflicts to the satisfaction of the regulatory agencies prior to commencing the Work.
- B. Codes: The referenced codes shall be the date of latest revision adopted by the authority having jurisdiction at the time of receiving bids, unless the date is given.
- C. Permits and Inspections: Contractor to obtain the required permits, inspections from the appropriate Federal, State, and Local permitting agencies. Permits, certificates and inspections which may be required include, but are not limited to:
 - 1. Construction permits and inspections.
 - 2. Environmental permits and inspections.
 - 3. Safety permits and inspections.

1.05 REFERENCES

A. Definitions.

- 1. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- 2. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- 3. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- 4. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- 6. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- 7. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- 8. Field Quality-Control Testing: Tests and inspections that are performed onsite for installation of the Work and for completed Work.
- 9. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- 10. Installer/Applicator/Erector: CONTRACTOR or another entity engaged by CONTRACTOR as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - a. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
 - b. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists much be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with

the CONTRACTOR.

- i). This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
- 12. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- 13. Basis of Design: Where specific manufacturers and products are listed as a "Basis of Design" in the Specification they shall represent the minimum acceptable standards for performance, physical properties and appearance where no additional prescriptive criteria are indicated.
- B. Reference Standards.
 - 1. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
 - 2. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 3. Conflicting Requirements: Where compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Request clarification in accordance with Contract requirements before proceeding with Work for which reference standards are different but apparently equal, and where it is uncertain which requirement is the most stringent.
 - Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Quality Control Manager for a decision before proceeding.
 - 4. Copies of Standards: Each entity performing Work on the Project should be familiar with industry standards applicable to its activity. Copies of applicable standards are not bound with the Contract Documents.

1.06 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to

demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

- B. Permits, Licenses, and Certificates: For Department's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- C. Test Reports: After each test/inspection, promptly submit one copies of report to Department's Representative and to CONTRACTOR.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Department's Representative, provide interpretation of results.
 - 2. Test report submittals are for Department Representative's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Fairbanks International Airport's information.

1.07 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful inservice performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of

successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 QUALITY CONTROL

- A. Department Responsibilities: Where quality-control services are indicated as Department's responsibility, Department will engage a qualified testing agency to perform these services.
 - 1. Department will furnish CONTRACTOR with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to CONTRACTOR.

- B. Tests and inspections not explicitly assigned to Department are CONTRACTOR's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform qualitycontrol services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as CONTRACTOR 's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. CONTRACTOR shall not employ same entity engaged by Department, unless agreed to in writing by Department.
 - 2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as CONTRACTOR 's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by CONTRACTOR and not required by the Contract Documents are CONTRACTOR 's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 30 00 Administrative Requirements: Submittals.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities and Limitations: Cooperate with Department, Department's Representatives, and CONTRACTOR in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 2. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 3. Notify Department, Department's Representatives, and CONTRACTOR promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 4. Perform additional tests and inspections required by Department's Representative.
 - 5. Submit reports of all tests/inspections as specified.

- 6. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
- 7. Do not perform any duties of CONTRACTOR.
- F. Associated Services: Cooperate with testing agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required qualityassurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Testing Laboratory Services
 - 1. CONTRACTOR shall employ and pay for services of an independent testing laboratory to perform inspections, tests, and other services required by individual Specification sections.
 - 2. Services will be performed in accordance with requirements of governing authorities and with specified standards.
 - 3 Reports will be submitted to Department in duplicate giving observations and results of tests, indicating compliance or non-compliance with specified standards and with Contract Documents.
 - CONTRACTOR shall cooperate with testing laboratory personnel; furnish tools, samples or materials, design mix, equipment, storage and assistance as requested.
 - a. Notify Department and testing laboratory 24 hours prior to expected time for operations requiring testing services.
 - b. Make arrangements with testing laboratory and pay for additional samples and tests for CONTRACTOR's convenience.

1.09 SPECIAL INSPECTIONS

- A. Special Inspections: Department will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Department and CONTRACTOR promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Department with copy to CONTRACTOR and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected work.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

- 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- 2. Comply with the Contract Document requirements for Section 01 73 00 Cutting and Patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are CONTRACTOR's responsibility, regardless of the assignment of responsibility for quality-control services.

SECTION 01 42 19 REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Quality Assurance.
- B. Applicability of Reference Standards.
- C. Provision of Reference Standards at site.
- D. Acronyms used in Contract Documents for Reference Standards. Source of Reference Standards.

1.02 RELATED REQUIREMENTS

A. Document 00700 - General Conditions: Paragraph 3.4.2.

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Project Advertisement date, or Effective Date of the Contract when there was no Advertisement, except when a specific date is specified.
- C. When required by an individual Specification section, obtain copy of standard. Maintain copy at site during submittals, planning, and progress of the specific Work, until Final Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding. Local code requirements, where more stringent than referenced standards, shall govern.
- E. Neither the contractual relationship, duties, nor responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCES

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, N.W. Washington, DC 20005
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219

ADC	Air Diffusion Council 230 North Michigan Avenue Chicago, IL 60601
AGC	Associated General Contractors America 1957 E Street, N.W. Washington, DC 20006
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
ARI	Air-Conditioning and Refrigeration Institute 1815 North Fort Myer Drive Arlington, VA 22209
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASPA	American Sod Producers Association Association Building Ninth and Minnesota Hastings, NE 68901

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 550 LeJeune Road Miami, FL 33135
CDA	Copper Development Association 57th Floor, Chrysler Building 405 Lexington Avenue New York, NY 10174
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
EJMA	Expansion Joint Manufacturers Association 707 Westchester Avenue White Plains, NY 10604
FGMA	Flat Glass Marketing Association 3310 Harrison White Lakes Professional Building Topeka, KS 66611
FM	Factory Mutual System 1151 Boston-Providence Turnpike Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Building 197 Washington, DC 20407

DHSS FAIRBANKS PIONEER H PROJECT NUMBER AJF 18-070	OME – GENERATOR UPGRADE C	Ret
	1603 Orrington Avenue Evanston, IL 60201	
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017	
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 815 15th Street, N.W. Washington, DC 20005	
MFMA	Maple Flooring Manufacturers Association 2400 East Devon Suite 205 Des Plaines, IL 60018	
MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120	
ML/SFA	Metal Lath/Steel Framing Association Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601	
NAAMM	National Association of Architectural Metal Manufacturer 221 North LaSalle Street Chicago, IL 60601	S
NEBB	National Environmental Balancing Bureau 8224 Old Courthouse Road Vienna, VA 22180	
NEMA	National Electrical Manufacturers' Association 2101 L Street, N.W. Washington, DC 20037	
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269	
NFPA	National Forest Products Association 1619 Massachusetts Avenue, N.W. Washington, DC 20036	
NSWMA	National Solid Wastes Management Association 1120 Connecticut Avenue, N.W. Washington, DC 20036	
NTMA	National Terrazzo and Mosiac Association 3166 Des Plaines Avenue Des Plaines, IL 60018	
PCA	Portland Cement Association 01 42 19 -4	

Skokie, IL 60077

- PCI Prestressed Concrete Institute 201 North Wacker Drive Chicago, IL 60606
- PS Product Standard U.S. Department of Commerce Washington, DC 20203
- RIS Redwood Inspection Service One Lombard Street San Francisco, CA 94111
- RCSHSB Red Cedar Shingle and Handsplit Shake Bureau 515 116th Avenue Bellevue, WA 98004
- SDI Steel Deck Institute Box 3812 St. Louis, MO 63122
- SDI Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
- SIGMA Sealed Insulating Glass Manufacturers Association 111 East Wacker Drive Chicago, IL 60601
- SJI Steel Joist Institute 1703 Parham Road Suite 204 Richmond, VA 23229
- SMACNA Sheet Metal and Air Conditioning Contractors' National Association 8224 Old Court House Road Vienna, VA 22180
- SSPC Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
- TAS Technical Aids Series Construction Specifications Institute 601 North Madison Street Alexandria, VA 22314
- TCA Tile Council of America, Inc. Box 326 Princeton, NJ 08540

WCLIB West Cost Lumber Inspection Bureau Box 23145 Portland, OR 97223

- PART 2 PRODUCTS (Not Used)
- PART 3 EXECUTION (Not Used)

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities
- B. Sanitary Facilities
- C. Barricades, Warnings, and Markings
- D. Enclosures
- E. Protection of Installed Work
- F. Security
- G. Field Offices
- H. Removal
- I. Cleaning During Construction
- J. Tool Control

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 Summary of Work
- B. Section 01 77 00 Closeout Procedures: Final cleaning

1.03 TEMPORARY UTILITIES

- A. Existing utilities may be used unless otherwise specified in following subsections. CONTRACTOR to verify all capacities if used.
- B. New permanent facilities may be used when available.

1.04 ELECTRICITY, LIGHTING

- A. Connecting to existing service is permitted.
- B Provide branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
- C. Provide lighting as required for construction operations.
- D. Department will pay the costs of energy used. Take precautions to conserve energy. Wasteful use of power will be back-charged to CONTRACTOR.

1.05 HEAT, VENTILATION

- A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.
- B. Do not use permanent facilities for temporary purposes.
- C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.06 TELECOMMUNICATIONS

A. Provide, maintain, and pay for telecommunications services as required at time of project mobilization.

1.07 WATER

- A. Provide service required for construction operations. Extend branch piping with outlets located so that water is available by use of hoses.
- B. Connecting to existing service is permitted.
- C. Department will pay the costs of water used. Use trigger-operated nozzles for water hoses, to avoid waste of water. Take other precautions to conserve water. Wasteful use of water will be back-charged to CONTRACTOR.
- D. Hoses or temporary piping will not be permitted in public areas where a hazard to the public may be created.

1.08 SANITARY FACILITIES

A. Existing facilities may be used during construction operations; maintain in clean sanitary condition. Do not use facilities for construction purposes or cleaning of construction equipment.

1.09 BARRICADES, WARNINGS, AND MARKINGS (AIRPORT OPERATIONS)

- A. The CONTRACTOR shall furnish, erect, and maintain all barricades, warning signs and markings for hazards, as necessary to protect the public, adjacent facilities and improvements, and the Work.
- B. For vehicular and pedestrian traffic, the CONTRACTOR shall furnish, erect, and maintain barricades, warnings signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).
- C. The CONTRACTOR shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stockpiles, and his parked construction equipment that may be hazardous to the operation of emergency, fire-rescue, or maintenance vehicles on the property in reasonable conformance to construction standards.
- D. Open-flame type lighting shall not be permitted.

1.10 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of any current or created

exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections or to a minimum 50 degrees F, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

B. Temporary heat shall be provided to match the performance of existing systems with respect to building pressurization, temperature and air exchange if areas open to the exterior are accessible to the public.

1.11 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from occupied areas, to prevent penetration of dust and moisture into occupied areas, and to prevent damage to existing materials and equipment.

1.12 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

1.13 SECURITY

A. Provide security program and facilities to protect Work, existing facilities, and Using Agency's operations from unauthorized entry, vandalism, and theft. Coordinate with Department security program.

1.14 FIELD OFFICES

A. Not required. If a field office is provided, the CONTRACTOR shall locate within the project limits or within an approved staging area. All utilities for the field office will be supplied by the Contractor.

1.15 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities.
- C. Restore permanent facilities used during construction to specified condition.
- A. Provide covered containers for deposit of materials, waste materials, debris, and rubbish. When located on where exposed to winds, prop wash, or jet blast, containers/materials shall be adequately secured to prevent release of waste materials.
- A. Provide covered containers for deposit of materials, waste materials, debris, and rubbish. When located on where exposed to winds, containers/materials shall be adequately secured to prevent release of waste materials.

3.01 GENERAL CLEANING

- A. Maintain areas under CONTRACTOR's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces prior to closing the space.
- C. Immediately clean interior areas after completion of the shift to provide suitable conditions for building occupants and tenants. Debris and dust accumulation found by the Project Manager to be unsatisfactory will be cleaned by the Department and cost incurred will be deducted from the Contract Price.
- D. Broom clean interior areas prior to start of surface finishing and continue cleaning on an as needed basis.
- E. Control cleaning operations so that dust and other particulates will not adhere to wet or newly-coated surfaces.

3.02 DISPOSAL

A. Promptly remove waste materials, debris, and rubbish from site periodically and dispose of off property in accordance with all Federal, State and local regulations.

3.03 EXTERIOR ROUTES AND CLEANUP

- A. All CONTRACTOR's access routes into site shall be swept clean of materials spilled by Contractor's operations. Spills shall be removed immediately upon occurring to avoid damage to vehicles.
- B. Remove loose material and debris from sides of haul vehicles prior to their leaving or entering the site to minimize spills. Assign one laborer with a hand broom to sweep off excess material that accumulates on the outside of the trucks during loading.
- C. Contractor shall have ten (10) minutes to begin cleanup operations with sufficient supplies of men and equipment to effectively clear the material. If Contractor has not begun sufficient cleanup operations within ten minutes of the memo, then \$50/minute will be deducted from the Contract Price until cleanup begins to the satisfaction of the Project Manager.
- D. If Contractor does not proceed with cleanup as required above, Department may proceed with cleanup operation and deduct cost of cleanup from the Contract Price.

3.04 TOOL CONTROL

- A. Do not leave work areas unattended without first removing or securing all tools, equipment, and objects.
- B. Tools will be confiscated if left unattended in the areas open to the public.

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Procedures for Fairbanks International Airport-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 Summary of Work.
- B. Section 01 40 00 Quality Requirements
- C. Section 01 77 00 Closeout Procedures

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Do not use products having any of the following characteristics:
- C. Where all other criteria are met, Contractor shall give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste.

2.03 PRODUCT OPTIONS

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

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Substitutions will be considered only after contract award. Comply with requirements specified in this section.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Fairbanks International Airport.

- 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- D. Substitution Submittal Procedure:
 - 1. Submit electronic copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The Department will notify CONTRACTOR in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect

to verify products are undamaged and are maintained in acceptable condition.

SECTION 01 73 00

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SCOPE INCLUDED

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

1.02 RELATED REQUIREMENTS

- A. Section 00700 General Conditions
- B. Individual Specifications Sections:
 - 1. Cutting and patching incidental to Work of the section.
 - 2. Advance notification to other sections of openings required in Work of those sections.
 - 3. Limitations on cutting structural members.

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

- A. Structural Elements: Do not alter structural elements, including those for equipment support, in a manner that could change their capacity for either the intended design loading or likely existing loading.
- B. Operational Elements: Do not alter operating system elements or related components in a manner that could reduce their capacity for the intended design performance or that would result in increased maintenance or decreased operational life. Operating elements include but are not limited to:
 - 1. Air or smoke barriers.
 - 2. Fire suppression and detection systems.
 - 3. Mechanical HVAC systems.
 - 4. Mechanical plumbing and waste systems.
 - 5. Mechanical control systems.
 - 6. Communications systems such as telecom, data, paging, and security.
 - 7. Electrical power and lighting systems.
- C. Miscellaneous Elements: Do not alter building elements that provide for thermal, moisture or noise control, or their related components, in a manner that could reduce their capacity for the intended design performance or that would result in increased maintenance or decreased operational life. Miscellaneous elements include but are not limited to:
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Noise and vibration control elements.
- D. Visual Requirements: Cutting and patching work which is exposed to view will be accomplished in a manner that results in no visual evidence of the work which, in the Department's opinion, reduces the prior aesthetic quality of the existing construction. Contractor shall remove and replace elements that have been altered in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Comply with provisions specified in other Specification sections.
- B. Use materials identical to in-place materials. At exposed surfaces, use of new materials should visually match in-place adjacent surfaces to the maximum extent possible.
- C. If identical materials are unavailable or cannot be used or for any change in materials, submit request for substitution under provisions of Section 01 60 00.

PART 3 - EXECUTION

3.01 GENERAL

- A. Execute cutting, fitting, and patching and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install ill-timed Work.
 - 3. Remove and replace non-conforming and Defective Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

3.02 INSPECTION

- A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
 - 1. Notify the Department immediately of any suspect hazardous materials.
- B. After uncovering, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.03 PREPARATION

- A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering Work; maintain excavations free of water.

3.04 PERFORMANCE

- A. Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- B. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- C. Restore Work with new products in accordance with requirements of Contract Documents.
- D. Fit Work tightly to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- E. At penetrations of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, full thickness of the construction element, or in accordance with listed U.L. assembly requirements.
- F. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Closeout Procedures.
- B. Final Cleaning.
- C. Project Record Documents.
- D. Operation and Maintenance Data
- E. Warranties
- F. Spare Parts and Maintenance Materials.
- G. Maintenance Service

1.02 RELATED REQUIREMENTS

- A. Section 00700 General Conditions: Fiscal provisions, legal submittals, and other administrative requirements.
- B. Section 01 10 00 Summary of Work: Using Agency Occupancy
- C. Section 01 40 00 Quality Requirements: Quality Control
- D. Section 01 50 00 Temporary Facilities and Controls: Cleaning During Construction.
- E. Section 01 78 00 Closeout Submittals.

1.03 CLOSEOUT PROCEDURES

- A. Substantial Completion and Final Completion:
 - 1. Substantial Completion:
 - a. Submit the following prior to requesting a Substantial Completion Inspection:
 - 1) Evidence of Compliance with Requirements of Governing Authorities.
 - i. Certificate of Occupancy.
 - ii. Required Certificates of Inspection.
 - 2. Project Record Documents in accordance with subsection 1.06, herein.
 - 3. Operation and Maintenance data in accordance with subsection 1.07, herein.

- 4. Spare Parts and Maintenance Materials in accordance with subsection 1.09, herein.
- B. Substantial Completion shall be considered by the Department when:
 - 1. Written notice is provided 7 days in advance of inspection date.
 - 2. List of items to be completed or corrected is submitted.
 - 3. Operation and Maintenance Manuals are submitted and approved by the Department.
 - 4. Equipment and systems have been tested, adjusted, balanced and are fully operational.
 - 5. Automated and manual controls are fully operational.
 - 6. Operation of system has been demonstrated to Department Personnel.
 - 7. Certificate of Occupancy is submitted.
 - 8. Certificates of Inspection for required inspections have been submitted.
 - 9. Project Record Documents for the Work or the portion of Work being accepted are submitted and approved.
 - 10. Spare parts and maintenance materials are turned over to Department.
 - 11. All keys are turned over to the Department.
- C. Should the Department inspection find Work is not substantially complete, the Department will promptly notify Contractor in writing, listing observed deficiencies.
- D. The Contractor shall remedy deficiencies and send a second written notice of Substantial Completion.
- E. When the Department finds Work is substantially complete, the Department will prepare a certificate of Substantial Completion in accordance with provisions of General Conditions.
- F. Final Completion:
 - 1. When Contractor considers Work is complete, submit written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been inspected for compliance with Contract Documents.
 - c. Work has been completed in accordance with Contract Documents, and deficiencies listed with certificate of Substantial Completion have been corrected.

- d. Work is complete and ready for final inspection.
- 2. Should the Department inspection find Work incomplete, Department will promptly notify Contractor in writing listing observed deficiencies.
- 3. Contractor shall remedy deficiencies and send a second certification of Final Completion.
- 4. When Department finds Work is complete, Department will consider closeout submittals.
- G. Reinspection Fees:
 - 1. Should status of completion of Work require more than two re-inspections by the Department due to failure of Work to comply with Contractor's responsibility, the Department will deduct the cost of re-inspection from final payment to Contractor as provided in the Contract Documents.
 - 2. Re-inspection fees shall not exceed \$5,000 for any one re-inspection.
- H. Closeout Submittals
 - 1. Warranties and Bonds: Under provisions of Section 01 70 00.
 - 2. Evidence of Payment: In accordance with Conditions of Contract.
 - 3. Consent of Surety to Final Payment.
 - 4. Certificates of Insurance for products and Completed Operations: In accordance with Supplementary Conditions.
 - 5. Certificate of Release.
- I. Application for Final Payment
 - 1. Submit application for final payment in accordance with provisions of the General Conditions of the Contract.
- J. Using Agency will occupy the facility for the purpose of conduct of business, under provisions stated in certificate of Substantial Completion.
- K. Department will issue a summary Change Order reflecting final adjustments to Contract Price not previously made by Change Order.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion inspection.
- B. Clean interior and exterior surfaces exposed to view, remove temporary labels, stains and foreign substances. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment. Clean site: sweep paved areas, rake clean other surfaces.
- C. Use materials which will not create hazards to health or property, and which will

not damage surfaces. Follow manufacturer's recommendations.

- D. Maintain cleaning until DEPARTMENT issues certificate of Substantial Completion.
- E. Remove waste, debris and surplus materials from the site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.

1.05 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following Record Documents; record actual revisions to the Work:
 - 1. Building Information Models.
 - 2. Drawings.
 - 3. Specifications.
 - 4. Addenda.
 - 5. Change Orders and other modifications to the Contract.
 - 6. Reviewed shop drawings, product data, and samples.
 - 7. Manufacturer's instructions for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Department.
- C. Store Record Documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and Modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction graphically to scale including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
 - 2. Measured depths of foundations in relation to finish floor datum.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.

- 5. Details not on original Contract drawings.
- G. As-built BIMs: Record actual construction organized by building system and floor and registered spatially including:
 - 1. All building systems, elements, and components as listed in the approved BIM Execution Plan.
 - 2. All Construction BIMs required by, and produced under the provision of 01 35 00.

1.07 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Submit data bound in 8-1/2" x 11" (A4) text pages, 3-D side ring binders with durable plastic covers.
- B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are requested.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with the tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on 24 pound white paper, in 3 parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operations and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - a. Significant design criteria
 - b. List of equipment
 - c. Parts list for each component
 - d. Operating instructions
 - e. Maintenance instructions for equipment and systems
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
 - 3. Part 3: Project Documents and Certificates, including the following:
 - a. Shop drawings and product data

- b. Certificates
- c. Originals of warranties and bonds
- E. Submit one draft copy of completed volumes five working days prior to Substantial Completion inspection. This copy will be reviewed and returned, with Department comments. Revise content of all documents sets as required prior to final submission.
- F. Submit three sets of revised final volumes within ten days after Substantial Completion Inspection.

1.08 WARRANTIES

- A. As a condition precedent to Final Payment, all guarantees and warranties as specified under various sections of the Contract Documents shall be obtained by the CONTRACTOR and delivered to the OWNER, in duplicate giving a summary of guarantees attached and stating the following in respect to each:
 - 1. Character of Work affected.
 - 2. Name of Subcontractors.
 - 3. Period of Guarantee.
 - 4. Conditions of Guarantee.
- B. Delivery of said guarantees and/or warrantees shall not relieve the CONTRACTOR from any obligations assumed under any other provision of the Contract.
- C. If, within any guarantee period, repairs or changes are required in connection with the guaranteed Work, which in the opinion of the OWNER is rendered necessary as the result of the use of materials, equipment or workmanship, which are defective, or inferior, or not in accordance with the terms of the Contract, the CONTRACTOR shall, upon receipt of notice from the OWNER, and without expense to the Department, proceed within seven (7) calendar days to:
 - 1. Place in satisfactory conditions in every particular all of such guaranteed Work, correct all defects therein, and make good all damages to the structure or site.
 - 2. Make good all Work or materials, or the equipment and contents of structures or site disturbed in fulfilling any such guarantee.
- D. If the CONTRACTOR, after notice, fails to comply without the terms of the guarantee, the Department may have the defects corrected and the CONTRACTOR and CONTRACTOR's Surety shall be liable for all expenses incurred in connection therewith, including Engineer's fees.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.

B. Deliver to project site and place in location as directed, obtain receipt prior to final payment.

1.10 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections for one year from date of Substantial Completion.
- B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Department.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

SECTION 01 78 00 CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 00700 General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 30 00 Administrative Requirements: Submittals
- C. Section 01 77 00 Closeout Procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Owner's Representative with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Owner's Representative will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Fairbanks Pioneer Home, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Owner's Representative comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Fairbanks Pioneer Home permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial

Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 – PRODUCTS

2.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. As-builts.
 - 2. Drawings.
 - 3. Specifications.
 - 4. Addenda.
 - 5. Change Orders and other modifications to the Contract.
 - 6. Reviewed shop drawings, product data, and samples.
 - 7. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Fairbanks Pioneer Home.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.

2.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

2.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking

instructions.

- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Provide control diagrams by controls manufacturer as installed.
- J. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- K. Include test and balancing reports.
- L. Additional Requirements: As specified in individual product specification sections.

2.05 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Owner's Representative, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

- a. Significant design criteria.
- b. List of equipment.
- c. Parts list for each component.
- d. Operating instructions.
- e. Maintenance instructions for equipment and systems.
- f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

2.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Fairbanks Pioneer Home's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Retain warranties and bonds until time specified for submittal.
- D. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- E. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- F. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- G. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

PART 3 – EXECUTION – NOT USED

SECTION 26 01 26 – MAINTENANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Feeder Megohm Testing.
- B. Receptacle Branch Circuit Testing.
- C. Ground Fault Circuit Interrupter Testing.
- D. Phase Rotation.
- E. Additional Testing and Maintenance Requirements in Individual Equipment and System Sections.

1.2 REFERENCES

- A. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. ANSI/TIA/EIA 568-B.1 and Addendums, General Cabling System Requirements.

1.3 SUBMITTALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Product Data: Submit technical information for each test instrument to include manufacturer, model number, serial number, ratings, accuracy, and National Institute of Standards and Technology (NIST) Traceable calibration certification.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit Test Reports per Section 26 05 00.

1.5 COORDINATION

A. Provide written 72 hours advance notice of all tests to be performed to allow Owner's Representative to witness testing.

1.6 REQUIRED TEST INSTRUMENTS

A. MEGOHMMETER.

- 1. Product Description: 1000 Volt DC, portable, insulation and resistance test Megohmmeter.
- 2. Equipment Accuracy:
 - a. 2000 Megohm Range 3% of full Scale.

B. BRANCH CIRCUIT ANALYZER

- 1. Product Description: Branch circuit analyzer capable of receptacle testing of voltage drop under load, hot-neutral-ground conductor resistances, common mode (N-G) Voltage, and G.F.C.I. trip point.
- 2. Manufacturer: Ideal SureTest. Model: 61-156 ST-1THD Wiring/Harmonic Distortion Analyzer or approved equal.
- 3. Equipment Accuracy:
 - a. Accuracy 1% full scale \pm 1 digit True RMS.

C. MULTIMETER

- 1. Product Description: Digital True RMS Multimeter.
- 2. Equipment Accuracy:
 - a. AC Voltage Range: 0.75% 6 3 last single digits at 60 Hz.
 - b. AC Current Range: 0.90% 6 3 last single digits at 60 Hz.
 - c. DC Voltage Range: 0.25% 6 1 last single digit.
 - d. DC Current Range: 0.75% 6 1 last single digit.
 - e. Resistance Ranges: 0.50% 6 1 last single digit.
 - f. Frequency Range: 0.10% 6 1 last single digit @ 60 Hz.

D. SOUND LEVEL METER

1. Product Description: Sound Level Meter meeting ANSI S.14a Type 2, Specifications for Sound Level Meters. Capable of A-Weighted measurement.

1.7 TEST INSTRUMENT CALIBRATION

- A. All test equipment shall be in good mechanical and electrical condition.
- B. Provide calibration for each test instrument directly traceable to the National Institute of Standards and Technology (NIST) of higher accuracy than that of the instrument tested.
- C. Provide calibration labels visible on all test equipment. Records, which show date and results of instruments calibrated or tested, shall be kept up-to-date.
- D. Calibrate instruments in accordance with the following frequency schedule:
 - 1. Field instruments: 12 months maximum.
 - 2. Up-to-date instrument calibration instructions and procedures shall be maintained for each test instrument with the equipment.

1.8 MINIMUM REPORT INFORMATION

- A. Report Criteria: After each test, promptly submit one copy of report to the Owner's Representative. Provide form with the minimum following information:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name and Model of Tester and witnesses.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Type of inspection or test.
 - 7. Date of test.
 - 8. Results of tests.
 - 9. Indicate compliance or non-compliance with Contract Documents.
 - 10. Final adjustment setting values where applicable.
- B. Submit copy of all tests performed in the O&M manual.

1.9 GENERAL REQUIREMENTS

- A. Submit test results within 3 working days of each test and included in the O&M manual.
- B. Provide qualified personnel at site to perform all testing.

- C. Perform specified testing of products in accordance with specified standards or as denoted in this specification whichever is more stringent.
- D. Promptly notify Owner's Representative of irregularities or non-conformance of Work or products.
- E. Perform additional tests when test is performed incorrectly, deemed inaccurate, or incorrectly documented.
- F. The Contractor shall provide all forms, instrumentation and test equipment, loads, and other consumables required to demonstrate the systems to Owner's Representative satisfaction.
- G. Perform and submit all testing prior to substantial completion and system acceptance.
- H. Retest all material, cables etc that are disturbed after testing.
- I. Replace and retest all material installed which does not meet or exceed the minimum acceptable limits set forth in this specification in accordance with the contract original requirements at no additional charge to Contract Sum/Price.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 FEEDER CONDUCTOR TEST

- A. Tests Criteria:
 - 1. Use Megohm meter to test all conductors sized #6AWG and larger.
 - 2. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential 1000 volts DC for 600 volt rated cable.
 - 3. Perform test immediately after installation.
 - 4. Clean exposed cable ends with clean cloth and alcohol.
 - 5. Test duration shall be one minute.
 - 6. Disconnect conductors from all equipment.
 - 7. Record the resistance of the insulated conductor under test with all other conductors connected together and to ground (metallic raceway, grounding conductor, etc).
 - 8. Perform continuity test to insure correct cable connection.

- a. Submit test results to Owner's Representative.
- B. Test Values:
 - 1. Minimum insulation-resistance value: 50 megohms.
 - 2. Investigate deviations between adjacent phases.

3.2 RECEPTACLE GROUND FAULT CIRCUIT INTERRUPTER TEST

- A. Test Criteria:
 - 1. Use Branch Circuit Analyzer to perform test of each GFCI protected receptacle.
 - 2. Record trip level in ma for each outlet.
 - 3. Submit test results to Owner's Representative.
- B. Test Values:
 - 1. Trip Range: Between 6-9 mA.

3.3 PHASE ROTATION TEST

- A. Test each three phase circuit and feeder for consistent phase rotation for the entire power system with a phase rotation meter.
- B. Bump test each motor for proper rotation prior to use.
- C. Correct conductor phase relationship to provide proper phase rotation.

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General Requirements specifically applicable to Division 26, in addition to Division 01 provisions.
- 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 WORK SEQUENCE

A. Construct Work in sequence under provisions of Division 01.

1.3 COORDINATION

- A. Coordinate the Work specified in this Division under provisions of Division 01.
- B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of Architect prior to proceeding.

1.4 **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 Architectural 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 Architectural, Civil, Structural, and Mechanical Drawings and adjust work to conform to conditions shown thereon. Field verification of dimensions, locations and levels is directed.

1.5 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.

1.6 SUBMITTALS

- A. Submit inspection and permit certificates under provisions of Division 01.
- B. Include certificate of final inspection and acceptance from authority having jurisdiction.
- C. 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.
- D. In addition to requirements referenced in Division 01, 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 Architect/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 Architect/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.

1.7 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.

1.8 PROJECT RECORD DRAWINGS

- A. Maintain project record drawings in accordance with Division 01.
- 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.

1.9 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. In addition to requirements referenced in Division 01, 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. Unless otherwise noted in Division 01, 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. Standby generator.
- 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) Distribution equipment.
 - b) 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.

1.10 DEMONSTRATION OF ELECTRICAL SYSTEMS

- A. During substantial completion inspection:
 - 1. Conduct operating test for approval under provisions of Division 01.
 - 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 light intensities, 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.

1.11 CERTIFICATE OF COMPLETION

- A. Submit, at time of request for final inspection, a completed letter in the following format:
- B. I, <u>NAME</u>, of <u>FIRM</u>, certify that the electrical work is complete in accordance with Contract Plans and Specifications, and authorized change orders (copies attached) and will be ready for final inspection as of <u>DATE</u>. I further certify that the following specification requirements have been fulfilled:
 - 1. _____megger readings performed, _____copies of logs attached.
 - 2. _____ground tests performed, _____copies of method used and results attached.
 - 3. _____operating manuals completed, <u>DATE</u>.
 - 4. SIGNED.
 - 5. Owner's Representative
 - 6. ____as-built drawings up-to-date and ready to deliver to Architect.
 - 7. Instruction of operating personnel completed on <u>DATE</u> by:
 - 8. SIGNED.
 - 9. Owner's Representative
 - 10. ____all other tests required by specifications have been performed.
 - 11. ____all systems are fully operational.
 - 12. SIGNED.

1.12 WARRANTY

- A. In addition to the requirements of Division 01, or as specified in other sections. Warrant 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.

1.13 INSTRUCTION OF OPERATING PERSONNEL

A. See section 26 32 00 for instruction for Owner representative.

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 Testing and Maintenance of Electrical Systems.
- B. Notify the Owner's representative at least 72 hours prior to conducting any tests.

- C. Following completion of installation, test system ground in accordance with the requirements of NETA ATS 7.13. and all feeders in accordance with NETA ATS 7.3. Submit logs of values obtained, and nameplate data of instruments used prior to final inspection. Include a copy of all data in the power distribution section of the Operation and Maintenance Manuals.
- D. Perform additional tests required under other sections of these specifications.
- E. Perform all tests in the presence of the Owner's representative.
- F. The Contractor shall provide written notification to the Owner's representative and the State Electrical Inspector thirty days in advance of requests for rough-in and substantial completion inspections.

3.3 PENETRATIONS OF FIRE BARRIERS

- A. Related information to this section appears in Division 07, Fire Stopping.
- B. 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.
- C. 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.
- D. The rating of the fire stops shall be the same as the time-rated floor, wall or ceiling assembly.
- E. Install fire stopping materials in accordance with the manufacturer's instructions.
- F. 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.
- G. Seal cable tray penetrations of fire rated floors, walls or ceilings with UL listed, reusable fire stop sealing bags.

SECTION 26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical Demolition.

1.2 RELATED SECTIONS

- A. Division 01 Alteration Project Procedures.
- B. Division 02 Minor Demolition for Remodeling.

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 non-destructive observation and existing record documents. Report discrepancies to Owner and Architect/Engineer 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. Coordinate utility service outages with Utility Company.
- C. 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.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of Division 01, Division 02, and 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 abandoned panelboards and distribution equipment.
- H. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- J. Repair adjacent construction and finishes damaged during demolition and extension work. Tbar ceiling tiles damaged under normal construction conditions or having voids where junction boxes were removed shall be replaced by the Contractor.
- K. Maintain access to existing electrical installations which remain active.
- L. Extend existing installations using materials and methods as specified.
- M. 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 not additional cost to the Owner.
- N. Relocate existing lighting fixtures as indicated on Drawings. Test fixture to see if it is in good working condition before installation at new location.

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. Install new breakers.
- 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 under the provisions of Division 01.

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. Federal Specification FS-A-A59544 Cable and Wire, Electrical (Power, Fixed Installation).
- B. Federal Specification FS-J-C-30B Cable Assembly, Power, Electrical.
- C. ANSI/NEMA WC 70-2009 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
- D. NETA ATS Acceptance testing specifications for Electrical Power Distribution and Systems.
- E. NFPA 70 National Electrical Code.
- F. NFPA 262 Standard Method of test for flame travel and smoke of wires and cables for use in air-handling spaces.
- G. UL 62 Flexible Cords and Cables.
- H. UL 83 Thermoplastic Insulated Wire and Cable.
- I. UL 1063 Standard for Machine and Tool Wire and Cable.
- J. UL 1569 Standard for Metal Clad Cable.
- K. UL 1581 Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.4 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5m) when tested in accordance with NFPA 262.

1.5 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.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Thermoplastic-insulated Building Wire: NEMA WC 5.
- 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

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. 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.
- C. Plenum 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 nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

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. Make Conductor lengths for parallel circuits equal.
- F. Wiring in lighting fixture channels shall be rated for 90° C minimum.
- G. 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 –5 degrees C and THHN/THWN conductors when ambient temperatures are below 0 degrees C.
- 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. Code sound and signal systems wiring and any special equipment in accordance with manufacturer's diagrams or recommendations.
- H. Do not exceed manufacturer's recommended pull tensions.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01 and 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. Metal clad cable.
- B. At the Contractor's option, Metal Clad cable may be used for branch circuit wiring other than homeruns. Homeruns shall be building wire in raceway. Metal Clad cable used for branch circuit wiring from a light switch to the light fixture shall include a neutral conductor.

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, Division 27 and Division 28.
- 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. ANSI/NEMA GR-1, Ground Rod Electrodes and Ground Rod Electrode Couplings.
- B. ANSI/NFPA 70 National Electrical Code.
- C. ASTM B 3 Standard Specification for Soft or Annealed Copper Wire.
- D. AWS A5.8/A5.8M Specification for Filler Metals for Brazing and Braze Welding.
- E. IEEE Std 142 Recommended Practice for Grounding of Industrial and Commercial Power System.
- F. 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. Product Data: Submit product data for all components provided, showing material type and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Drawings
 - 1. Accurately indicate actual locations of main grounding bus, all grounding rods, concrete encased electrodes, etc.
- B. Test Reports
 - 1. See Section 26 01 26 Maintenance Testing of Electrical Systems for Grounding System Tests.

1.7 COORDINATIONS

- A. Division 01 Administrative Requirements: Requirements for Coordination.
- B. Complete grounding and bonding of building reinforcing steel prior to concrete placement.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Ground Rods: ANSI/NEMA GR-1, copper-encased steel, ³/₄ inch diameter, minimum length 10 feet. Ground rods shall be clean and smooth.
- B. 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.
- C. Grounding Conductors: Copper conductor bare or green insulated.
- D. Mechanical Grounding and Bonding Connectors: Non-reversible crimp type lugs only. Use factory made compression lug for all terminations.
- E. Exothermic Grounding and Bonding Connectors: AWS A5.8/A5.8M Exothermic welded type. Welding procedure shall include the proper mold and powder charge and shall conform to the manufacturer's recommendations.

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 system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing and fuel systems.
- 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.
- E. Ground rods shall be installed so that the top of the rod is not less than 12 inches below finished grade. Conceal after inspection.

3.2 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Perform system ground test as specified in Section 26 01 26 Maintenance Testing of Electrical Systems.
- C. 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 INCLUDED

- A. Conduit Supports.
- B. Formed Steel Channel.
- C. Spring Steel Clips.
- D. Sleeves.
- E. Equipment Bases and Supports.

1.2 RELATED WORK

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. Division 01: Requirements for submittals.
- B. Product Data: Submit product data for specialty supports.
- C. Seismic Restraint Calculations:
 - Provide structurally engineered shop drawings and calculations 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.

2. Shop drawings shall be stamped by a professional engineer registered in the State of Alaska.

1.5 COORDINATION

A. Coordinate size, shape and location of concrete pads with Division 03.

1.6 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

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.

2.3 SLEEVES

- A. Sleeves Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sleeves Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Fire-stopping Insulation: Glass fiber type, non-combustible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Division 01: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.

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 precast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry partitions and walls; expansion anchors or preset inserts 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, telecommunication pathways 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 colorcoded. Exception: Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or ceiling suspension system.

- D. 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.
- E. In wet locations install free-standing electrical equipment on concrete pads. Pad top shall be a minimum of 3 ¹/₂" above the surrounding grade and shall be reinforced in accordance with Division 3 of these specifications.
- F. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- G. Securely fasten fixtures and equipment to building structure in accordance with manufacturer's recommendations and to provide necessary earthquake anchorage.
- H. 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.
- I. 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.
- J. Power-driven fasteners are prohibited for tension load applications (such as supporting luminaries or conduit racks from ceiling above). Use drilled-in expansion anchors, or drilled and screw-in anchors such as Kwik-Con II or Tapcon.

3.4 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

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. Nonmetallic Conduit.
- 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.
- B. Division 01 General Requirements, Summary, Administrative Requirements.
- C. Section 26 05 00 Common Work Results for Electrical.
- D. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- E. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- F. Section 26 05 29 Hangers and Supports for Electrical Systems.
- G. Section 26 05 53 Identification for Electrical Systems.
- H. 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.
- 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):
 - 1. 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 TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 - 4. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. Underwriters Laboratory (UL):
 - 1. UL 6 Rigid Steel Conduit, Zinc Coated.
 - 2. UL 514B Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. UL651B Continuous Length HDPE Conduit.
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code.
- F. Telecommunications Industry Association (TIA) and Electronics Industries Association (EIA):
 - 1. ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard.
- G. Building Industry Consulting Service International (BICSI):
 - 1. BICSI Telecommunication Design Methods Manual.
- H. International Building Code (IBC):
 - 1. IBC chapters 16 and 17 seismic requirements.

1.4 RACEWAY AND BOX INSTALLATION SCHEDULE

- 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 ¹/₂ inch for final connection of raceway up to 6 feet for connection to fixture or device where maximum conduit entry size is ¹/₂ inch.
- B. Underground more than 5 feet from foundation wall:
 - 1. Raceway: Provide rigid steel conduit, intermediate metal, or HDPE 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.
- C. Under or in concrete slab, or underground within 5 feet of foundation wall:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. All conduit in contact with concrete or block shall be HDPE conduit, 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.
- D. 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.
- E. 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.

- F. 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.
- G. 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.
- H. Branch Circuits 60 Amperes or Larger and Feeders:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. HDPE conduit may be used where installed underground.
 - 2. Boxes and Enclosures: Provide sheet-metal boxes.
 - 3. Fittings: Provide galvanized malleable iron and steel.
- I. 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, etc.

1.5 DESIGN REQUIREMENTS

- A. Raceway Minimum Size:
 - 1. 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.

1.6 SUBMITTALS

- A. Section 01 33 00 Submittals and Section 26 05 00 Electrical General Provisions.
- B. 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)

- A. 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 type with insulated throat bushings. Zinc die cast, or indentor fittings are not acceptable.
- C. Maximum size shall be 2". Provide factory elbows on sizes 2" and larger.

2.6 RIGID NONMETALLIC CONDUIT (RNC)

- A. Product Description: NEMA TC 2; Schedule 80 PVC, rated for 90° C cable.
- B. Fittings and Conduit Bodies: NEMA TC 3.
- C. Provide PVC-coated rigid steel factory elbows for bends in all plastic conduit runs, regardless of length.

2.7 HIGH DENSITY POLYETHYLENE CONDUIT (HDPE)

- A. Conduit: NEMA TC 7; HDPE conduit rated for 90° C cable. Provide Schedule 40 conduit for trade sizes up to 2" and Schedule 80 conduit for trade sizes above 2".
- B. Provide conduit with pullstring installed.
- C. Fittings and Conduit Bodies: NEMA TC 7.
- D. HDPE to RMC Couplings: Basis of design is Duraline "Shur-Lock II" or equal.
- E. HDPE to HDPE Couplings: Butt-fusion, electro-fusion couplers, self-threading couplings, or drive-on couplings. All couplings shall be UL listed for the intended purpose.

2.8 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.

- 2. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required. Minimum Size: 4 inches square or octagonal, 2-1/8 inches deep.
- 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.

2.9 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. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure. Hoffman or approved equal.
- C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250, Type 4; flatflanged, surface mounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.
- D. Cast Metal Boxes for Underground Installations: NEMA 250, Type 4; flat-flanged, flushmounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with outside flange, neoprene gasket, and recessed stainless steel cover and screws.
- E. 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".

2.10 EXPANSION FITTINGS

A. Galvanized malleable iron, galvanized with grounding bond jumper.

2.11 BUSHINGS

A. Non-grounding: Threaded impact resistant plastic.

B. Grounding: Insulated galvanized malleable iron/steel with hardened screw bond to raceway and conductor lug.

2.12 LOCKNUTS

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

2.13 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. Do not install raceway imbedded in spray applied fire proofing. Seal raceway penetrations of fire-rated walls, ceilings, floors in accordance with the requirements of Section 26 05 00.
- H. Route raceway through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket. Coordinate all requirements with Division 07 of these specifications.
- I. Where raceway penetrates fire-rated walls and floors seal opening around conduit with UL listed firestop sealant or intumescent firestop, preserving the fire time rating of the construction.
- J. 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.
- K. Conduit embedded in concrete or solid masonry shall not be larger than 1/3 the thickness of the wall or slab and shall be spaced not less than three diameters apart. No cutting of reinforcing bars shall be permitted unless specifically approved. Should structural members prevent the installation of conduit or equipment, notify the Contracting Officer before proceeding.
- L. Route conduits in slabs to have 1 inch minimum cover. Conduits in slab shall not compromise the structural integrity of the slab.
- M. 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.
- N. 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.
- O. 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.

- P. 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.
- Q. 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.
- R. Install no more than the equivalent of three 90-degree bends between boxes.
- S. Install conduit bodies to make sharp changes in direction, such as around beams. "Goosenecks" in conduits are not acceptable.
- T. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.
- U. 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.
- V. Avoid moisture traps; install junction box with drain fitting at low points in raceway system.
- W. Install fittings and flexible metal conduit to accommodate 3-axis movements where raceway crosses seismic joints.
- X. Install fittings designed and listed to accommodate expansion and contraction where raceway crosses control and expansion joints.
- Y. Stub a minimum of 2 inches above floor all raceways terminated beneath free standing service equipment, pad mounted equipment, etc.
- Z. 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.
- AA. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
- BB. Provide nylon "jet-line" or approved equal pull string in empty raceway, except sleeves and nipples.
- CC. 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.

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.
- 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. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- E. 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.
- F. Adjust box location up to 6 feet prior to rough-in to accommodate intended purpose.
- G. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- H. Unless otherwise specifically noted, locate outlet boxes for light switches within 6 inches of the door jamb on the latch side of the door.
- I. Position outlets to locate luminaires as shown on reflected ceiling plans.
- J. Locate and install boxes to maintain headroom and to present a neat appearance.
- K. Provide knockout closures for unused openings.
- L. Install boxes in walls without damaging wall insulation or reducing its effectiveness.
- M. Support boxes independently of conduit.
- N. Clean interior of boxes to remove dust, debris, and other material and clean exposed surfaces and restore finish.
- O. 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.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Nameplates and Tape Labels.
- B. Wire and Cable Markers.
- C. Wire Markers.
- D. Conduit Markers.
- E. Underground Warning Tape.
- F. Working Clearance Striping.
- G. Power One-line Diagram and Panel Map.

1.2 RELATED WORK

- 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 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.

1.3 SUBMITTALS

- A. Division 01 and 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.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

- D. Prior to installation, submit power one-line diagram and panel map for review.
- E. 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.
- F. Electrical One-Line Diagrams and Panel Maps: Provide electronically in AutoCAD format, submitted with the O&M manuals.

1.4 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 RhinoPro 5000 label printer or approved equal.
- B. Embossed adhesive tape will <u>not</u> be permitted for any application.

2.3 WIRE MARKERS

- A. Power and Lighting 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: Yellow, 6-inch wide, detectable.
- B. Wording to read "Caution Buried Electric Line Below".

2.5 POWER DISTRIBUTION SYSTEM ONE-LINE DIAGRAM AND PANEL MAP

- A. Product Description: One-line diagram and building floor plan panel map. One-line diagram shall show the complete building power system. Panel map shall show the plan view location of all distribution panels and branch panelboards. Minimum size shall be 11"x17" but larger maps are recommended. All text shall be legible without magnification.
- B. Install one-line and panel map behind a Plexiglas cover screwed to wall on four corners, adjacent to the MDP.

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, or using rivets. The use of adhesives is not acceptable. Machine screws to not protrude more than 1/16 inch on back side.
- B. Distribution Panel Nameplates:
 - 1. Provide circuit breaker identification for each feeder breaker.
 - a. Line 1: Name of panelboard or equipment served.
 - b. Line 2: Location of served panelboard.
- C. Branch Panelboard Nameplates:
 - 1. Provide nameplate for each panelboard with the following information:
 - a. Line 1: Panelboard name.

- b. Line 2: Source from which the panelboard is fed.
- c. Line 3: Voltage, phase and wire configuration.
- d. Line 4: AIC rating of the panelboard.
- D. 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: Fuse or Circuit amperage and poles. Where fused disconnect is installed, denote the maximum fuse size to be installed.

3.3 LABEL INSTALLATION

- A. Conduit Feeder Labels Provide conduit labels on all feeder raceways as follows:
 - 1. Panelboards "PANEL xxxx FED FROM MDP".
- B. Spare Raceways: Provide raceway label on each individual raceway denoting the source and termination point at each end.

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 and lighting circuits, 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 lighting and 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.

3.7 PANELBOARD IDENTIFICATION

- A. Provide panelboard circuit directories in accordance with Section 26 24 16.
- B. Install one-line and panel map adjacent to the MDP.

END OF SECTION

SECTION 26 05 83 - WIRING CONNECTIONS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Electrical connections to equipment specified under other Sections.

1.2 RELATED WORK

- A. Division 01 Administrative Requirements; Summary: Owner-furnished equipment.
- B. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems.

1.3 REFERENCES

- A. FS W-C-596 Electrical Power Connector, Plug, Receptacle, and Cable Outlet.
- B. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 General Purpose Wiring Devices.
 - 2. NEMA WD 5 Specific-Purpose Wiring Devices.

1.4 SUBMITTALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.5 COORDINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORDS AND CAPS

- A. Straight-blade Attachment Plug: NEMA WD 1.
- B. Locking-blade Attachment Plug: NEMA WD 5.
- C. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.
- D. Cord Construction: Oil-resistant thermoset insulated Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp locations.
- E. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 PREPARATION

A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

3.3 INSTALLATION

- A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.
- B. Make conduit connections to equipment that is subject to vibration or movement using flexible conduit. Use Liquidtight flexible conduit in damp or wet locations.
- C. Install pre-finished cord set where connection with attachment plug is indicated or specified by the equipment manufacturer's installation instructions, or use attachment plug with suitable strain-relief clamps.
- D. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.
- E. Make wiring connections in control panel or in wiring compartment of pre-wired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where required.

- F. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches and connect with conduit and wiring as indicated in the equipment manufacturer's installation instructions.
- G. Where reconnecting existing equipment, extend connections using materials and methods compatible with existing electrical installations, or as specified.

3.4 ADJUSTING

A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lighting and Appliance Branch Circuit Panelboards.

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.

1.3 REFERENCES

- A. NEMA AB 1 Molded Case Circuit Breakers.
- B. NEMA KS 1 Enclosed Switches.
- C. NEMA PB 1 Panelboards.
- D. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- E. NEMA PB 2.2 Application Guide for Ground-fault Protective Devices for Equipment.
- F. UL 50 Enclosures for Electrical Equipment.
- G. UL 67 Panelboards.
- H. UL 98 Enclosed and Dead-front Switches.
- I. UL 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures.
- J. 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 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.

1.6 OPERATION AND MAINTENANCE MATERIALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Provide product data and shop drawing information including replacement parts list.
- C. Provide installation, operation and maintenance information per manufacturer.
- D. Project record data: Submit final record panel schedules as hardcopy and in Microsoft Excel format.

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. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1. Boxes shall be galvanized steel constructed in accordance with UL50 requirements. Interiors shall be field convertible for top or bottom incoming feed. Main lug interiors up to 400 amperes shall be field convertible to main breaker. 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 door-in-door cover 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. Main/Sub Feed Circuit Breakers: NEMA AB 1; Provide vertical mount main and/or sub feed circuit breaker in panelboards as shown on the drawings.
 - 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. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
 - 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.
- H. 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.

- 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 SWD for lighting circuits.
- 4. Provide circuit breakers UL listed as type HACR for use with heating, air conditioning and refrigeration equipment.
- 5. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

2.3 PANELBOARD IDENTIFICATION

- A. For each panelboard 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 designated by the Owner. Schedule shall not be typed with names shown on the Contract Drawings unless names are acceptable to the Owner.
- B. Provide panel schedule in O&M manual for every new panelboard and every existing panelboard where circuits are added or modified.
- C. 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.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
 - A. Wall Switches.
 - B. Receptacles.
 - C. 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 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 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 20 General-Use Snap Switches.
- F. UL 498 Attachment Plugs and Receptacles.
- G. 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.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Indicate actual locations and mounting heights of all wiring devices on the project record drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - WALL SWITCHES

- A. Hubbell.
- B. Leviton.
- C. Pass & Seymour.
- D. Arrow Hart
- E. Substitutions: Under provisions of Division 01.

2.2 WALL SWITCHES

A. Wall Switches for Lighting Circuits: UL 20; NEMA WD 1; and Federal Specification FS W-S-896 AC industrial grade snap switch with toggle handle, rated 20 amperes and 120-277 volts AC. Handle: White nylon. Provide single-pole, 3-way, or 4-way switches as indicated on Plans.

2.3 ACCEPTABLE MANUFACTURERS - RECEPTACLES

- A. Hubbell.
- B. Leviton.
- C. Pass & Seymour.
- D. Arrow Hart
- E. Substitutions: Under provisions of Division 01.

2.4 RECEPTACLES

- A. Convenience and Straight-blade Receptacles: UL 498, NEMA WD 1 and Federal Specification FS W-C-596 industrial grade receptacle.
- B. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R, white nylon face.
- C. GFCI Receptacles: 20A, duplex convenience receptacle with integral class 'A' ground fault current interrupter, LED indicator lamp and integral lockout.
- D. Weather-Resistant Receptacles: Listed to the weather-resistant supplement of UL498 and complying with the requirements of NEC 406.9.

2.5 DEVICE PLATES

- A. Decorative Cover Plate: Smooth 430 or 302 stainless steel.
- 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.
- C. Exposed Work Cover Plate: ¹/₂ 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 wall switches 48 inches above floor, OFF position down.
- B. Unless otherwise noted install wall switches within 6 inches of the door jamb on the strike side.
- C. Install convenience receptacles 18 inches above floor.
- D. Unless otherwise noted, mounting heights are for finished floor to center line of outlet.
- E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- F. Install devices and wall plates flush and level.
- G. Ground receptacles to boxes with a grounding wire. Grounding through the yoke or screw contact is not an acceptable alternate to the ground wire.

END OF SECTION

SECTION 26 32 00 - PACKAGED GENERATOR ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Contractor designed and installed packaged, pre-wired, turnkey generator power distribution system and walk-in module. This is a performance type specification describing the minimum acceptable packaged engine generator system. The Contractor shall design and install the packaged engine generator system and power distribution system in accordance with the requirements of NFPA 70, NFPA 110 and IBC. The packaged engine generator and power distribution system and suggested locations and suggested dimensions, the final layout, location and dimensions of equipment and devices shall be solely determined by the Contractor and shall be in accordance with NFPA 70, NFPA 110 and IBC and shall be as a minimum consist of:
 - 1. Packaged engine generator systems.
 - 2. Generator mounted radiators.
 - 3. Exhaust silencers and fittings.
 - 4. Fuel fittings and sub-base fuel tank.
 - 5. Engine Mounted control panels.
 - 6. Batteries and chargers.
 - 7. Generator Module Building.
 - 8. Distribution and Branch Panels.

1.2 RELATED SECTIONS

- A. 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 33 Raceway and Boxes for Electrical Systems
- F. Section 26 24 16 Panelboards
- G. Section 26 27 26 Wiring Devices

H. Section 26 36 00 – Transfer switches.

1.3 REFERENCES

- A. ANSI/NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. ANSI/NEMA MG 1 Motors and Generators.
- C. ANSI/NFPA 70 National Electrical Code.
- D. ANSI/NEMA AB 1 Molded Case Circuit Breakers.
- E. UL 2200 Standard for Stationary Engine Generator Assemblies: The genset shall be listed to UL2200 or submitted to an independent third party certification process to verify compliance as installed.
- F. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- G. International Building Code (IBC), Chapter 16 Structural Design.
- H. ASCE 7-10

1.4 SYSTEM DESCRIPTION

- A. Engine generator system to provide source of standby power for entire facility.
- B. System Capacity: 250kW, 313 KVA, prime rating at elevation of 1000 feet above sea level, and ambient temperature between -40 and 104° F; using engine mounted radiator and load bank.
- C. Operation: In accordance with ANSI/NFPA 110.
- D. The Packaged Generator System, module and all dimensions, and performance data are based on Cummins model: DQDAA. The CONTRACTOR shall make all necessary modifications required for other manufactures, at no additional cost to the OWNER, if Cummins equipment is not supplied.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Submit shop drawings showing plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.
- C. Submit product data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, sub-base fuel day tank, remote radiator, and remote annunciator.

- D. Provide structurally engineered shop drawings as specified in Section 26 05 29 for seismic restraint of all equipment required by the 2015 IBC, Chapter 16 (1621). Equipment requiring structural shop drawings includes, but is not limited to the following: Generator Pad, Generator Module, Skid-mounted engine/generator, sub-base fuel tank, radiator, and vibration isolators. See plans for additional generator pad information.
- E. Submit shop drawings, product data and calculations for the walk-in enclosure, complete, including dimensioned layout of all equipment in plan view and elevation.
- F. Submit manufacturer's installation instructions under provisions of Division 01.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Division 01.
- B. Accurately record location of engine generator and mechanical and electrical connections.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.
- B. Include instructions for the following:
 - 1. Normal operation.
 - 2. Routine maintenance requirements, including replacement of filters.
 - 3. Starting battery inspection/maintenance.
 - 4. System coolant and other fluid inspection and replacement.
 - 5. Oil sampling and analysis for engine wear.
 - 6. Emergency maintenance procedures.
- C. Provide manufacturer's service manuals for all equipment, including but not limited to the following: Engine, generator, radiator, and fuel tank.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in packaged engine generator system with minimum three years documented experience.
- B. Supplier: Authorized distributor of engine generator manufacturer with service facilities within the State of Alaska.

1.9 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. Accept packaged engine generator set and accessories on site in crates and inspect for damage.
- D. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

1.10 WARRANTY

A. Provide two year, 6000 hour warranty under provisions of Division 01. The complete electrical power system (generator sets, controls, automatic transfer switches and associated switches and accessories, generator module) shall be warranted by the manufacturer against defects in materials and workmanship for a period of two years or 6000 hours, whichever occurs first from the date of beneficial occupancy. Warranty shall include parts, labor, travel expenses and labor to remove/reinstall equipment. There shall be no deductibles applied to the warranty.

1.11 MAINTENANCE SERVICE

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

1.12 EXTRA MATERIALS

- A. Submit maintenance materials under provisions of Division 01.
- B. Furnish one set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal tool box.
- C. Provide two additional sets of each fuel, oil, and air filter element required for the engine generator system.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Cummins (Basis of Design).
 - B. Caterpillar.
 - C. Kohler.

D. Substitutions: Under provisions of Division 01.

2.2 ENGINES

- A. Type: Water-cooled inline or V-type, four stroke cycle, compression ignition Diesel internal combustion engine.
- B. Rating: Sufficient to operate rated load at 10 percent overload for one hour at specified elevation and ambient limits.
- C. Fuel System: Appropriate for use of No. 1 (Arctic grade) fuel oil.
- D. Engine Speed: 1800 rpm.
- E. Governor: Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes.
- F. Safety Devices: Engine shutdown on high water temperature, high lube oil temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.
- G. 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 instructions. Include remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- H. Engine Jacket Heater: UL499 listed and labeled thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90° F, and suitable for operation on 120 volts AC.
- Radiator: Engine mounted radiator using 50/50 glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 100° F and freeze protection to -50 °F. Radiator Air Flow Restriction: 0.5 inches of water, maximum. Rotating parts shall be guarded against accidental contact.
- J. Engine Accessories:
 - 1. Oil Pump: Positive displacement, mechanical, full pressure, lubrication oil pump.
 - 2. Fuel Pump: An engine driven, mechanical, positive displacement fuel pump. Include fuel priming pump.
 - 3. Fuel filter with a replaceable spin-on canister element. Provide Racor #500FG or approved equal pre-filter, with water shutdown sensor tied to control panel.
 - 4. Replaceable dry element air cleaner with restriction indicator.
 - 5. Water pump.
 - 6. Lube oil cooler.

- 7. Lube Oil Drain: Extend the lube oil drain to the outside of the generator skid using Areoequip fittings. Install a Nibco T 113 shut off valve on the hose at an accessible location of the unit and cap the end of the hose with a ³/₄" NPT cap.
- K. Mounting: Provide unit with suitable spring-type vibration isolators and mount on structural steel base.

2.3 GENERATORS

- A. Generator: ANSI/NEMA MG 1; three phase, four pole, reconnectible brushless synchronous generator with brushless exciter.
- B. Rating: 250 kW, 313 kVA, at 0.8 power factor, 208Y/120 volts, 60Hz at 1800 rpm.
- C. Insulation: ANSI/NEMA MG 1, Class F.
- D. Temperature Rise: 105° C continuous.
- E. Enclosure: ANSI/NEMA MG 1; open drip proof.
- F. Voltage Regulation: Include generator-mounted volts per Hertz exciter-regulator to match engine and generator characteristics, with voltage regulation +/- one percent from no load to full load. Include manual controls to adjust voltage drop +/- 5 percent voltage level, and voltage gain.
- G. Frequency Regulation: Isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
- H. The diesel engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- I. 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 with not more than 3% in any single harmonic.
- J. Generator Leads: The generator leads shall be brought out and terminated on a unit-mounted generator circuit breaker. The generator leads shall have sufficient length to allow for any connection configuration.

2.4 GENERATOR MODULE

- A. Manufacturer: To be furnished as an integral unit, packaged, turnkey with generator by same supplier. For additional requirements see structural specifications.
- B. Structural Framing:

- 1. Framing consists of rolled structural shapes in accordance with ASTM-A36 specifications.
- 2. All connections shall be of all welded design in accordance with the International Building Code (IBC) latest edition and amendments.
- 3. The roof shall saddle type and slope in two directions.
- 4. All structural steel shall be primed with a marine alkyd primer proceeding fabrication. No top coat is applied.
- 5. Include a stairway with landing to access the walk-in enclosure.
- C. Exterior Composite Panels:
 - 1. Roof, Soffit and wall panels shall consist of 4" nominal polyurethane foam composite panels suitable of outdoor environments with suitable through fasteners.
 - 2. All panels shall feature tongue and groove joints tested in accordance with ASTM-E331 and ASTM-E283 for dust infiltration and water penetration. All Panel joints shall be foam to foam contact only eliminating frost creep, all voids in corners shall be foam filled.
 - 3. All panels shall be designed and approved to Factory Mutual (FM4880) and Class 1 fire rated construction. All panels shall be UL classified by UL subject 1040.
 - 4. Flame spread: 10
 - 5. Smoke development: 125
 - 6. R-value: 26(actual)
 - 7. Temperature range: -50° F to $+100^{\circ}$ F.
 - 8. Interior and exterior steel shall be of galvanized, G-90 finish, factory painted with baked on thermosetting silicone modified polyester coatings. Twenty year guarantee on finish. Color shall be white inside and exterior color shall match the surrounding buildings.
 - 9. Exterior doors shall be of freezer type complete with arctic grade seals and access hardware.
- D. Support Baseframe:
 - 1. The generator sets and all ancillaries shall be supported on the prefabricated steel base frame designed to withstand the forces of damage fatigue as a result of transportation and placement at site.
 - 2. There shall be two longitudinal wide flange beams provided as the main support positioned inward of the perimeter and to provide skidding as required. Additional thermal break between the rails and the enclosure shall be provided.

- 3. Floor plate shall consist of 3/16" diamond plate galvanized steel properly braced and stiffened to prevent "oil canning." All seams shall be stitch welded. At the Contractor's option an epoxy coated floor system may be used in lieu of the diamond plate.
- 4. Four lifting eyes shall be provided in relation to the center of gravity.
- E. Electrical:
 - 1. The following electrical components shall be supplied and installed in accordance with UL and the National Electric Code (NEC):
 - 2. 100 amp, 120/208V, 3-phase, 4W lighting and service panel complete with 100 amp main and required branch breakers. Panel to be fed from main distribution panel and be tagged "GEN".
 - 3. Electric unit heater with thermostat.
 - 4. Install LED fixtures as indicated on the drawings, low temperature driver, high impact acrylic diffuser and "damp location" listing to provide an average lighting level of 30 footcandles throughout the module. Provide light switch at entry to module for control interior lights.
 - 5. Emergency lighting to be provided via emergency battery pack ballasts inside the light fixtures. See drawings for fixture locations.
 - 6. A minimum of three interior duplex receptacles in addition to those required to operate the battery charger and engine block heater. A minimum of one GFCI protected exterior duplex receptacle with an "In-Use" listed weatherproof cover.
 - 7. All components shall be wired in accordance with Specification Sections 26 05 00, 26 05 19, and 26 05 33 and in compliance with the National Electrical Code.
- F. Ventilation:
 - 1. All motor operated dampers and motors shall be provided and pre-wired to a relay panel with controls.
 - 2. All openings shall include weatherhoods and ³/₄" birdscreens. Coordinate hood locations and configuration with site and building layout. Intake openings shall be a minimum of 72" Above finished grade.
 - 3. Motor operated intake dampers shall be provided to minimize thermal shock during winter and prevent snow infiltration. For summer operation, include motor operated dampers at the opposite side of the engine generator room to provide suitable cross flow ventilation.
 - 4. Ventilation of the module shall be designed with a recirculating air plenum for the engine sized accordingly for the air flow requirements.
 - 5. The temperature of the room shall be monitored by a thermostat which shall operate a modulating damper assembly which in turn shall be connected to the radiator discharge

and the recirculating air plenum. The plenum shall allow the warm air from the radiator discharge to enter back into the room to mix with incoming cold air.

- G. Heating:
 - 1. Electric unit heaters shall be provided to heat generator enclosure.
- H. Temperature Control System:
 - 1. Temperature controls shall be provided to operate electric unit heaters and generator dampers.

I. Insulation:

1. Insulate all ductwork, engine exhaust piping and muffler.

2.5 ACCESSORIES

- A. Sub-Base Tanks: Double-wall, all-welded construction, base-mounted fuel tank with a minimum capacity of 72Hrs. The tank outside dimensions shall not exceed the dimensions of the generator framework. The tank shall have foundation to ground clearance for visual secondary leak detection, shall have the structural integrity to support the engine-generator set, shall be supplied by the engine-generator set manufacturer, and shall be installed before shipment. The tank shall be UL 142 listed for both primary and secondary containment and shall meet all of the requirements of NFPA for the intended use. The tank shall have the following features; vent connections, tank-mounted fuel gauge, flexible fuel line connections, check valve, inlet solenoid valve, high and low fuel level alarm contacts and indicating lights. All appurtenances shall meet all state and local codes.
- B. Exhaust Silencers: Nelson Special "400" or approved supercritical type silencer, with a minimum overall attenuation level of 40 dB(A) and a maximum exhaust pressure drop not to exceed the engine manufacturer's recommendations at the rated engine exhaust gas flow rate and temperature. Provide with ANSI 150# companion flanges and flexible stainless steel exhaust fitting, suitable for horizontal orientation with side entry and end exit, sized in accordance with engine manufacturer's instructions. Dual exhaust engines shall be provided with one silencer similar to the above combining the two exhaust outlets into a single outlet
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, sized as recommended by the engine/generator set manufacturer for starting the set at 0°F ambient. Match battery voltage to starting system. Include necessary cables and clamps.
- D. Battery Trays: Non-metallic battery boxes with covers and hold-downs, treated for electrolyte resistance and constructed to contain spillage of electrolyte. Provide with seismic restraints to secure batteries during earthquakes. The battery housing shall be mounted outside the engine/generator skid base
- E. Battery Chargers: Dual-rate, 12-Amp, current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Provide overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Provide wall-mounted enclosure to meet

ANSI/NEMA 250, Type 1 requirements. 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.
- F. Line Circuit Breaker: NEMA AB 1 molded case circuit breaker on generator output with integral thermal and instantaneous magnetic 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. Mount unit in enclosure to meet ANSI/NEMA 250, Type 1 requirements.
- G. Engine-Generator Control Panel: NEMA 250, Type 1 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. Fuel pressure gauge.
 - 12. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.

- 13. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions.
- 14. Overcrank protection with manual reset.
- 15. Trouble horn with silencing switch, red indicating light and reset switch.
- 16. Auxiliary Relay for Building Automation System Monitoring: Provide dry contact relays for monitoring of Generator Status and General Alarm by BAS. Coordination with Specification Section 23 09 23.
- H. Remote Annunciator Panels: Provide flush mounted 20-light LED type remote alarm annunciator panels with brushed stainless steel finish and alarm horn, located as shown on the Drawings. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 2 systems for the local generator control panel. Annunciator shall be labeled with the specified functions. Alarm silence and lamp test switches shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Alarm horn shall be switchable for all annunciation points. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel. Provide alarm horn, and indicators and alarms as follows:

Condition	Lamp Color	Audible Alarm
Genset Running	Green	No
Not in Auto	Red (Flashing)	Yes
High Battery Voltage	Red	Yes
Low Battery Voltage	Red	Yes
Charger AC Failure	Red	Yes
Fail to Start	Red	Yes
Low Engine Temperature	Amber	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Amber	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
Overcrank	Red	Yes
Emergency Stop	Red	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Amber	Yes
Network OK	Green	Yes
(4) Spares	Configurable	Configurable

- I. Low battery voltage lamp shall also be lighted for low cranking voltage or weak battery alarm.
- J. Heaters: Provide manufacturer's recommended heaters with thermostatic controls to keep engine oil pan, engine block, generator controls, and generator windings within manufacturer's

recommended temperature at 30°F. Provide immersion type coolant heater in remote radiator to keep radiator within manufacturer's recommended temperature at -20°F.

K. Mounting: The complete engine/generator package shall be mounted on a common, selfsupporting, low profile, structural steel skid base with rubber in shear vibration isolators between the engine and base and spring type vibration isolators with seismic snubbers between the base and the module. 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 a #1/0 awg copper grounding conductor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and field dimensions are as shown on Drawings.
- B. Verify that required utilities are available in proper location and ready for use.
- C. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Ground and bond generator and other electrical system components in accordance with NEC requirements.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Provide a (4) hour load tests utilizing a portable load bank. Simulate power failure including operation of each transfer switch, automatic starting cycle, and automatic shutdown, and return to normal. Demonstrate all automatic features as directed by the Owner's Representative. Load bank testing shall be done as follows:
 - 1. 1 hour at 50% rated load.
 - 2. 1 hour at 75% rated load.
 - 3. 2 hours at 100% rated load.
 - 4. 10 minutes at 110% rated load.
- C. During test, record the following at 20 minute intervals:
 - 1. Kilowatts.

- 2. Amperes.
- 3. Voltage.
- 4. Coolant temperature.
- 5. Room temperature.
- 6. Frequency.
- 7. Oil pressure.
- D. Test alarm and shutdown circuits by simulating conditions.
- E. Upon completion of the load bank test, provide a test under full available (building) load for 2 hours for witness by the Authority Having Jurisdiction and the Owner's Representative. Simulate power failures from ATS with load transfer and normal cool-down cycle. Record voltage, current, and frequency during building load test. Note any required adjustments. Furnish record of tests to the Owner.

3.4 MANUFACTURER'S FIELD SERVICES

A. Prepare, start, test, and adjust systems under provisions of Division 01.

3.5 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust generator output voltage and engine speed.

3.6 CLEANING

- A. Clean work under provisions of Division 01.
- B. Clean engine and generator surfaces. Replace oil and fuel filters.

3.7 DEMONSTRATION

- A. Provide systems demonstration under provisions of Division 01.
- B. Describe loads connected to standby system and restrictions for future load additions.
- C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

SECTION 26 36 00 - 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 13 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 sections under Division 01 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; Automatic 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.
- 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

- A. Cummins/Onan.
- B. ASCO.
- C. Kohler.
- D. Caterpillar.
- E. Substitutions: Under provisions of Division 01.

2.2 AUTOMATIC TRANSFER SWITCH

- A. Description: NEMA ICS 2, UL 1008 listed 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. Closed Transition type:

- 1. The CTTS shall transfer the load without interruption (closed transition) by momentarily connecting both sources of power only when both sources are present and acceptable. The maximum interconnection time is 100 milliseconds. The CTTS shall operate as a conventional break-before-make (open transition) switch when the power source serving the load fails.
- 2. Source differential sensing shall be provided for the closed transition operating mode. The sensor shall enable transfer/re-transfer between live sources in the closed transition mode only when the two sources have a maximum voltage differential of 5%, frequency differential of 0.2 Hz and are within 5 electrical degrees.
- 3. Closed transition transfer shall be accomplished with no power interruption and without altering or actively controlling standby generator set.

2.3 SERVICE CONDITIONS

- A. Service Conditions: NEMA ICS 1.
- B. Operating Temperature: minus 40°F to plus 140°F.
- C. Altitude: 1,000 feet.

2.4 RATINGS

- A. Voltage: 208 volts, three phase, three wire, 60 Hz.
- B. Switched Poles: As noted on the drawings.
- C. Load Inrush Rating: Combination load.
- D. Continuous Rating: As noted on the Drawings.
- E. Interrupting Capacity: 250 percent of continuous rating.
- F. Withstand Current Rating: The switch shall be rated to withstand 65,000 Amps rms symmetrical short circuit current for 3 cycles. Withstand ratings requiring special breakers are not permitted.

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 provide 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 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. "REST/LAMP TEST" pushbutton that will clear any faults present in the control or simultaneously test all lamps on the panel by lighting them.
 - 6. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via the operator display panel.
 - 7. Security key switch or controller password protection to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless the ken is in place and operated.
 - 8. Analog AC meter display panel to display 3-phase AC Amps, 3-phase AC Volts, Hz, kW load level, and load power factor. The display shall be color-coded with green scale indicating normal or acceptable operating level, yellow indicating conditions nearing a fault and red indicating operation in excess of rated conditions for the transfer switch.
 - 9. LCD backlight 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. Display load data including 3-phase AC voltage, 3-phase AC current, frequency, kW, kVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.
- d. 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.
- e. 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.
- f. 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. Display fault history on the transfer switch including condition, date and time of fault. Faults shall include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, network battery voltage low, network communications error.
- G. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600 VAC. 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.
- 8. Monitoring the neutral current flow in the load side of the transfer switch. The control shall initiate an alarm when the neutral current exceeds a preset adjustable value in the range of 100 150% (set at 125%) of rated phase current for more than an adjustable time period of 10 to 60 seconds (set at 45 seconds).
- I. The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0 15 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.

- 3. 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 1. 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.

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 emergency/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.

SECTION 26 01 26 – MAINTENANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Feeder Megohm Testing.
- B. Receptacle Branch Circuit Testing.
- C. Ground Fault Circuit Interrupter Testing.
- D. Phase Rotation.
- E. Additional Testing and Maintenance Requirements in Individual Equipment and System Sections.

1.2 **REFERENCES**

- A. NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. ANSI/TIA/EIA 568-B.1 and Addendums, General Cabling System Requirements.

1.3 SUBMITTALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Product Data: Submit technical information for each test instrument to include manufacturer, model number, serial number, ratings, accuracy, and National Institute of Standards and Technology (NIST) Traceable calibration certification.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit Test Reports per Section 26 05 00.

1.5 COORDINATION

A. Provide written 72 hours advance notice of all tests to be performed to allow Owner's Representative to witness testing.

1.6 REQUIRED TEST INSTRUMENTS

A. MEGOHMMETER.

- 1. Product Description: 1000 Volt DC, portable, insulation and resistance test Megohmmeter.
- 2. Equipment Accuracy:
 - a. 2000 Megohm Range 3% of full Scale.

B. BRANCH CIRCUIT ANALYZER

- 1. Product Description: Branch circuit analyzer capable of receptacle testing of voltage drop under load, hot-neutral-ground conductor resistances, common mode (N-G) Voltage, and G.F.C.I. trip point.
- 2. Manufacturer: Ideal SureTest. Model: 61-156 ST-1THD Wiring/Harmonic Distortion Analyzer or approved equal.
- 3. Equipment Accuracy:
 - a. Accuracy 1% full scale \pm 1 digit True RMS.

C. MULTIMETER

- 1. Product Description: Digital True RMS Multimeter.
- 2. Equipment Accuracy:
 - a. AC Voltage Range: 0.75% 6 3 last single digits at 60 Hz.
 - b. AC Current Range: 0.90% 6 3 last single digits at 60 Hz.
 - c. DC Voltage Range: 0.25% 6 1 last single digit.
 - d. DC Current Range: 0.75% 6 1 last single digit.
 - e. Resistance Ranges: 0.50% 6 1 last single digit.
 - f. Frequency Range: 0.10% 6 1 last single digit @ 60 Hz.

D. SOUND LEVEL METER

1. Product Description: Sound Level Meter meeting ANSI S.14a Type 2, Specifications for Sound Level Meters. Capable of A-Weighted measurement.

1.7 TEST INSTRUMENT CALIBRATION

- A. All test equipment shall be in good mechanical and electrical condition.
- B. Provide calibration for each test instrument directly traceable to the National Institute of Standards and Technology (NIST) of higher accuracy than that of the instrument tested.
- C. Provide calibration labels visible on all test equipment. Records, which show date and results of instruments calibrated or tested, shall be kept up-to-date.
- D. Calibrate instruments in accordance with the following frequency schedule:
 - 1. Field instruments: 12 months maximum.
 - 2. Up-to-date instrument calibration instructions and procedures shall be maintained for each test instrument with the equipment.

1.8 MINIMUM REPORT INFORMATION

- A. Report Criteria: After each test, promptly submit one copy of report to the Owner's Representative. Provide form with the minimum following information:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name and Model of Tester and witnesses.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Type of inspection or test.
 - 7. Date of test.
 - 8. Results of tests.
 - 9. Indicate compliance or non-compliance with Contract Documents.
 - 10. Final adjustment setting values where applicable.
- B. Submit copy of all tests performed in the O&M manual.

1.9 GENERAL REQUIREMENTS

- A. Submit test results within 3 working days of each test and included in the O&M manual.
- B. Provide qualified personnel at site to perform all testing.

- C. Perform specified testing of products in accordance with specified standards or as denoted in this specification whichever is more stringent.
- D. Promptly notify Owner's Representative of irregularities or non-conformance of Work or products.
- E. Perform additional tests when test is performed incorrectly, deemed inaccurate, or incorrectly documented.
- F. The Contractor shall provide all forms, instrumentation and test equipment, loads, and other consumables required to demonstrate the systems to Owner's Representative satisfaction.
- G. Perform and submit all testing prior to substantial completion and system acceptance.
- H. Retest all material, cables etc that are disturbed after testing.
- I. Replace and retest all material installed which does not meet or exceed the minimum acceptable limits set forth in this specification in accordance with the contract original requirements at no additional charge to Contract Sum/Price.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 FEEDER CONDUCTOR TEST

- A. Tests Criteria:
 - 1. Use Megohm meter to test all conductors sized #6AWG and larger.
 - 2. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential 1000 volts DC for 600 volt rated cable.
 - 3. Perform test immediately after installation.
 - 4. Clean exposed cable ends with clean cloth and alcohol.
 - 5. Test duration shall be one minute.
 - 6. Disconnect conductors from all equipment.
 - 7. Record the resistance of the insulated conductor under test with all other conductors connected together and to ground (metallic raceway, grounding conductor, etc).
 - 8. Perform continuity test to insure correct cable connection.

- a. Submit test results to Owner's Representative.
- B. Test Values:
 - 1. Minimum insulation-resistance value: 50 megohms.
 - 2. Investigate deviations between adjacent phases.

3.2 RECEPTACLE GROUND FAULT CIRCUIT INTERRUPTER TEST

- A. Test Criteria:
 - 1. Use Branch Circuit Analyzer to perform test of each GFCI protected receptacle.
 - 2. Record trip level in ma for each outlet.
 - 3. Submit test results to Owner's Representative.
- B. Test Values:
 - 1. Trip Range: Between 6-9 mA.

3.3 PHASE ROTATION TEST

- A. Test each three phase circuit and feeder for consistent phase rotation for the entire power system with a phase rotation meter.
- B. Bump test each motor for proper rotation prior to use.
- C. Correct conductor phase relationship to provide proper phase rotation.

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General Requirements specifically applicable to Division 26, in addition to Division 01 provisions.
- 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 WORK SEQUENCE

A. Construct Work in sequence under provisions of Division 01.

1.3 COORDINATION

- A. Coordinate the Work specified in this Division under provisions of Division 01.
- B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of Architect prior to proceeding.

1.4 **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 Architectural 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 Architectural, Civil, Structural, and Mechanical Drawings and adjust work to conform to conditions shown thereon. Field verification of dimensions, locations and levels is directed.

1.5 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.

1.6 SUBMITTALS

- A. Submit inspection and permit certificates under provisions of Division 01.
- B. Include certificate of final inspection and acceptance from authority having jurisdiction.
- C. 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.
- D. In addition to requirements referenced in Division 01, 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 Architect/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 Architect/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.

1.7 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.

1.8 PROJECT RECORD DRAWINGS

- A. Maintain project record drawings in accordance with Division 01.
- 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.

1.9 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. In addition to requirements referenced in Division 01, 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. Unless otherwise noted in Division 01, 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. Standby generator.
- 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) Distribution equipment.
 - b) 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.

1.10 DEMONSTRATION OF ELECTRICAL SYSTEMS

- A. During substantial completion inspection:
 - 1. Conduct operating test for approval under provisions of Division 01.
 - 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 light intensities, 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.

1.11 CERTIFICATE OF COMPLETION

- A. Submit, at time of request for final inspection, a completed letter in the following format:
- B. I, <u>NAME</u>, of <u>FIRM</u>, certify that the electrical work is complete in accordance with Contract Plans and Specifications, and authorized change orders (copies attached) and will be ready for final inspection as of <u>DATE</u>. I further certify that the following specification requirements have been fulfilled:
 - 1. _____megger readings performed, _____copies of logs attached.
 - 2. _____ground tests performed, _____copies of method used and results attached.
 - 3. _____operating manuals completed, <u>DATE</u>.
 - 4. SIGNED.
 - 5. Owner's Representative
 - 6. ____as-built drawings up-to-date and ready to deliver to Architect.
 - 7. Instruction of operating personnel completed on <u>DATE</u> by:
 - 8. SIGNED.
 - 9. Owner's Representative
 - 10. ____all other tests required by specifications have been performed.
 - 11. ____all systems are fully operational.
 - 12. SIGNED.

1.12 WARRANTY

- A. In addition to the requirements of Division 01, or as specified in other sections. Warrant 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.

1.13 INSTRUCTION OF OPERATING PERSONNEL

A. See section 26 32 00 for instruction for Owner representative.

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 Testing and Maintenance of Electrical Systems.
- B. Notify the Owner's representative at least 72 hours prior to conducting any tests.

- C. Following completion of installation, test system ground in accordance with the requirements of NETA ATS 7.13. and all feeders in accordance with NETA ATS 7.3. Submit logs of values obtained, and nameplate data of instruments used prior to final inspection. Include a copy of all data in the power distribution section of the Operation and Maintenance Manuals.
- D. Perform additional tests required under other sections of these specifications.
- E. Perform all tests in the presence of the Owner's representative.
- F. The Contractor shall provide written notification to the Owner's representative and the State Electrical Inspector thirty days in advance of requests for rough-in and substantial completion inspections.

3.3 PENETRATIONS OF FIRE BARRIERS

- A. Related information to this section appears in Division 07, Fire Stopping.
- B. 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.
- C. 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.
- D. The rating of the fire stops shall be the same as the time-rated floor, wall or ceiling assembly.
- E. Install fire stopping materials in accordance with the manufacturer's instructions.
- F. 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.
- G. Seal cable tray penetrations of fire rated floors, walls or ceilings with UL listed, reusable fire stop sealing bags.

SECTION 26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical Demolition.

1.2 RELATED SECTIONS

- A. Division 01 Alteration Project Procedures.
- B. Division 02 Minor Demolition for Remodeling.

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 non-destructive observation and existing record documents. Report discrepancies to Owner and Architect/Engineer 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. Coordinate utility service outages with Utility Company.
- C. 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.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of Division 01, Division 02, and 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 abandoned panelboards and distribution equipment.
- H. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- J. Repair adjacent construction and finishes damaged during demolition and extension work. Tbar ceiling tiles damaged under normal construction conditions or having voids where junction boxes were removed shall be replaced by the Contractor.
- K. Maintain access to existing electrical installations which remain active.
- L. Extend existing installations using materials and methods as specified.
- M. 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 not additional cost to the Owner.
- N. Relocate existing lighting fixtures as indicated on Drawings. Test fixture to see if it is in good working condition before installation at new location.

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. Install new breakers.
- 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 under the provisions of Division 01.

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. Federal Specification FS-A-A59544 Cable and Wire, Electrical (Power, Fixed Installation).
- B. Federal Specification FS-J-C-30B Cable Assembly, Power, Electrical.
- C. ANSI/NEMA WC 70-2009 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
- D. NETA ATS Acceptance testing specifications for Electrical Power Distribution and Systems.
- E. NFPA 70 National Electrical Code.
- F. NFPA 262 Standard Method of test for flame travel and smoke of wires and cables for use in air-handling spaces.
- G. UL 62 Flexible Cords and Cables.
- H. UL 83 Thermoplastic Insulated Wire and Cable.
- I. UL 1063 Standard for Machine and Tool Wire and Cable.
- J. UL 1569 Standard for Metal Clad Cable.
- K. UL 1581 Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.4 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5m) when tested in accordance with NFPA 262.

1.5 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.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Thermoplastic-insulated Building Wire: NEMA WC 5.
- 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

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. 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.
- C. Plenum 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 nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

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. Make Conductor lengths for parallel circuits equal.
- F. Wiring in lighting fixture channels shall be rated for 90° C minimum.
- G. 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 –5 degrees C and THHN/THWN conductors when ambient temperatures are below 0 degrees C.
- 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. Code sound and signal systems wiring and any special equipment in accordance with manufacturer's diagrams or recommendations.
- H. Do not exceed manufacturer's recommended pull tensions.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01 and 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. Metal clad cable.
- B. At the Contractor's option, Metal Clad cable may be used for branch circuit wiring other than homeruns. Homeruns shall be building wire in raceway. Metal Clad cable used for branch circuit wiring from a light switch to the light fixture shall include a neutral conductor.

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, Division 27 and Division 28.
- 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. ANSI/NEMA GR-1, Ground Rod Electrodes and Ground Rod Electrode Couplings.
- B. ANSI/NFPA 70 National Electrical Code.
- C. ASTM B 3 Standard Specification for Soft or Annealed Copper Wire.
- D. AWS A5.8/A5.8M Specification for Filler Metals for Brazing and Braze Welding.
- E. IEEE Std 142 Recommended Practice for Grounding of Industrial and Commercial Power System.
- F. 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. Product Data: Submit product data for all components provided, showing material type and dimensions. Each catalog sheet should be clearly marked to indicate exact part number provided, including all options and accessories.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Drawings
 - 1. Accurately indicate actual locations of main grounding bus, all grounding rods, concrete encased electrodes, etc.
- B. Test Reports
 - 1. See Section 26 01 26 Maintenance Testing of Electrical Systems for Grounding System Tests.

1.7 COORDINATIONS

- A. Division 01 Administrative Requirements: Requirements for Coordination.
- B. Complete grounding and bonding of building reinforcing steel prior to concrete placement.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Ground Rods: ANSI/NEMA GR-1, copper-encased steel, ³/₄ inch diameter, minimum length 10 feet. Ground rods shall be clean and smooth.
- B. 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.
- C. Grounding Conductors: Copper conductor bare or green insulated.
- D. Mechanical Grounding and Bonding Connectors: Non-reversible crimp type lugs only. Use factory made compression lug for all terminations.
- E. Exothermic Grounding and Bonding Connectors: AWS A5.8/A5.8M Exothermic welded type. Welding procedure shall include the proper mold and powder charge and shall conform to the manufacturer's recommendations.

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 system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing and fuel systems.
- 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.
- E. Ground rods shall be installed so that the top of the rod is not less than 12 inches below finished grade. Conceal after inspection.

3.2 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Perform system ground test as specified in Section 26 01 26 Maintenance Testing of Electrical Systems.
- C. 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 INCLUDED

- A. Conduit Supports.
- B. Formed Steel Channel.
- C. Spring Steel Clips.
- D. Sleeves.
- E. Equipment Bases and Supports.

1.2 RELATED WORK

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. Division 01: Requirements for submittals.
- B. Product Data: Submit product data for specialty supports.
- C. Seismic Restraint Calculations:
 - Provide structurally engineered shop drawings and calculations 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.

2. Shop drawings shall be stamped by a professional engineer registered in the State of Alaska.

1.5 COORDINATION

A. Coordinate size, shape and location of concrete pads with Division 03.

1.6 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

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.

2.3 SLEEVES

- A. Sleeves Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sleeves Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Fire-stopping Insulation: Glass fiber type, non-combustible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Division 01: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.

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 precast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry partitions and walls; expansion anchors or preset inserts 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, telecommunication pathways 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 colorcoded. Exception: Do not fasten supports to piping, ductwork, mechanical equipment, conduit, or ceiling suspension system.

- D. 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.
- E. In wet locations install free-standing electrical equipment on concrete pads. Pad top shall be a minimum of 3 ¹/₂" above the surrounding grade and shall be reinforced in accordance with Division 3 of these specifications.
- F. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- G. Securely fasten fixtures and equipment to building structure in accordance with manufacturer's recommendations and to provide necessary earthquake anchorage.
- H. 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.
- I. 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.
- J. Power-driven fasteners are prohibited for tension load applications (such as supporting luminaries or conduit racks from ceiling above). Use drilled-in expansion anchors, or drilled and screw-in anchors such as Kwik-Con II or Tapcon.

3.4 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

END OF SECTION

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. Nonmetallic Conduit.
- 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.
- B. Division 01 General Requirements, Summary, Administrative Requirements.
- C. Section 26 05 00 Common Work Results for Electrical.
- D. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- E. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- F. Section 26 05 29 Hangers and Supports for Electrical Systems.
- G. Section 26 05 53 Identification for Electrical Systems.
- H. 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.
- 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):
 - 1. 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 TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 - 4. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- D. Underwriters Laboratory (UL):
 - 1. UL 6 Rigid Steel Conduit, Zinc Coated.
 - 2. UL 514B Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. UL651B Continuous Length HDPE Conduit.
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code.
- F. Telecommunications Industry Association (TIA) and Electronics Industries Association (EIA):
 - 1. ANSI/TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard.
- G. Building Industry Consulting Service International (BICSI):
 - 1. BICSI Telecommunication Design Methods Manual.
- H. International Building Code (IBC):
 - 1. IBC chapters 16 and 17 seismic requirements.

1.4 RACEWAY AND BOX INSTALLATION SCHEDULE

- 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.
- B. Underground more than 5 feet from foundation wall:
 - 1. Raceway: Provide rigid steel conduit, intermediate metal, or HDPE 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.
- C. Under or in concrete slab, or underground within 5 feet of foundation wall:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. All conduit in contact with concrete or block shall be HDPE conduit, 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.
- D. 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.
- E. 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.

- F. 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.
- G. 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.
- H. Branch Circuits 60 Amperes or Larger and Feeders:
 - 1. Raceway: Provide rigid steel conduit or intermediate metal conduit. HDPE conduit may be used where installed underground.
 - 2. Boxes and Enclosures: Provide sheet-metal boxes.
 - 3. Fittings: Provide galvanized malleable iron and steel.
- I. 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, etc.

1.5 DESIGN REQUIREMENTS

- A. Raceway Minimum Size:
 - 1. 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.

1.6 SUBMITTALS

- A. Section 01 33 00 Submittals and Section 26 05 00 Electrical General Provisions.
- B. 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)

- A. 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 type with insulated throat bushings. Zinc die cast, or indentor fittings are not acceptable.
- C. Maximum size shall be 2". Provide factory elbows on sizes 2" and larger.

2.6 RIGID NONMETALLIC CONDUIT (RNC)

- A. Product Description: NEMA TC 2; Schedule 80 PVC, rated for 90° C cable.
- B. Fittings and Conduit Bodies: NEMA TC 3.
- C. Provide PVC-coated rigid steel factory elbows for bends in all plastic conduit runs, regardless of length.

2.7 HIGH DENSITY POLYETHYLENE CONDUIT (HDPE)

- A. Conduit: NEMA TC 7; HDPE conduit rated for 90° C cable. Provide Schedule 40 conduit for trade sizes up to 2" and Schedule 80 conduit for trade sizes above 2".
- B. Provide conduit with pullstring installed.
- C. Fittings and Conduit Bodies: NEMA TC 7.
- D. HDPE to RMC Couplings: Basis of design is Duraline "Shur-Lock II" or equal.
- E. HDPE to HDPE Couplings: Butt-fusion, electro-fusion couplers, self-threading couplings, or drive-on couplings. All couplings shall be UL listed for the intended purpose.

2.8 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.

- 2. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required. Minimum Size: 4 inches square or octagonal, 2-1/8 inches deep.
- 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.

2.9 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. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure. Hoffman or approved equal.
- C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250, Type 4; flatflanged, surface mounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.
- D. Cast Metal Boxes for Underground Installations: NEMA 250, Type 4; flat-flanged, flushmounted junction box, UL listed as raintight:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with outside flange, neoprene gasket, and recessed stainless steel cover and screws.
- E. 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".

2.10 EXPANSION FITTINGS

A. Galvanized malleable iron, galvanized with grounding bond jumper.

2.11 BUSHINGS

A. Non-grounding: Threaded impact resistant plastic.

B. Grounding: Insulated galvanized malleable iron/steel with hardened screw bond to raceway and conductor lug.

2.12 LOCKNUTS

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

2.13 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. Do not install raceway imbedded in spray applied fire proofing. Seal raceway penetrations of fire-rated walls, ceilings, floors in accordance with the requirements of Section 26 05 00.
- H. Route raceway through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket. Coordinate all requirements with Division 07 of these specifications.
- I. Where raceway penetrates fire-rated walls and floors seal opening around conduit with UL listed firestop sealant or intumescent firestop, preserving the fire time rating of the construction.
- J. 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.
- K. Conduit embedded in concrete or solid masonry shall not be larger than 1/3 the thickness of the wall or slab and shall be spaced not less than three diameters apart. No cutting of reinforcing bars shall be permitted unless specifically approved. Should structural members prevent the installation of conduit or equipment, notify the Contracting Officer before proceeding.
- L. Route conduits in slabs to have 1 inch minimum cover. Conduits in slab shall not compromise the structural integrity of the slab.
- M. 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.
- N. 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.
- O. 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.

- P. 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.
- Q. 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.
- R. Install no more than the equivalent of three 90-degree bends between boxes.
- S. Install conduit bodies to make sharp changes in direction, such as around beams. "Goosenecks" in conduits are not acceptable.
- T. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.
- U. 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.
- V. Avoid moisture traps; install junction box with drain fitting at low points in raceway system.
- W. Install fittings and flexible metal conduit to accommodate 3-axis movements where raceway crosses seismic joints.
- X. Install fittings designed and listed to accommodate expansion and contraction where raceway crosses control and expansion joints.
- Y. Stub a minimum of 2 inches above floor all raceways terminated beneath free standing service equipment, pad mounted equipment, etc.
- Z. 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.
- AA. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
- BB. Provide nylon "jet-line" or approved equal pull string in empty raceway, except sleeves and nipples.
- CC. 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.

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.
- 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. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- E. 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.
- F. Adjust box location up to 6 feet prior to rough-in to accommodate intended purpose.
- G. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- H. Unless otherwise specifically noted, locate outlet boxes for light switches within 6 inches of the door jamb on the latch side of the door.
- I. Position outlets to locate luminaires as shown on reflected ceiling plans.
- J. Locate and install boxes to maintain headroom and to present a neat appearance.
- K. Provide knockout closures for unused openings.
- L. Install boxes in walls without damaging wall insulation or reducing its effectiveness.
- M. Support boxes independently of conduit.
- N. Clean interior of boxes to remove dust, debris, and other material and clean exposed surfaces and restore finish.
- O. 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.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Nameplates and Tape Labels.
- B. Wire and Cable Markers.
- C. Wire Markers.
- D. Conduit Markers.
- E. Underground Warning Tape.
- F. Working Clearance Striping.
- G. Power One-line Diagram and Panel Map.

1.2 RELATED WORK

- 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 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.

1.3 SUBMITTALS

- A. Division 01 and 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.
- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

- D. Prior to installation, submit power one-line diagram and panel map for review.
- E. 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.
- F. Electrical One-Line Diagrams and Panel Maps: Provide electronically in AutoCAD format, submitted with the O&M manuals.

1.4 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 RhinoPro 5000 label printer or approved equal.
- B. Embossed adhesive tape will <u>not</u> be permitted for any application.

2.3 WIRE MARKERS

- A. Power and Lighting 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: Yellow, 6-inch wide, detectable.
- B. Wording to read "Caution Buried Electric Line Below".

2.5 POWER DISTRIBUTION SYSTEM ONE-LINE DIAGRAM AND PANEL MAP

- A. Product Description: One-line diagram and building floor plan panel map. One-line diagram shall show the complete building power system. Panel map shall show the plan view location of all distribution panels and branch panelboards. Minimum size shall be 11"x17" but larger maps are recommended. All text shall be legible without magnification.
- B. Install one-line and panel map behind a Plexiglas cover screwed to wall on four corners, adjacent to the MDP.

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, or using rivets. The use of adhesives is not acceptable. Machine screws to not protrude more than 1/16 inch on back side.
- B. Distribution Panel Nameplates:
 - 1. Provide circuit breaker identification for each feeder breaker.
 - a. Line 1: Name of panelboard or equipment served.
 - b. Line 2: Location of served panelboard.
- C. Branch Panelboard Nameplates:
 - 1. Provide nameplate for each panelboard with the following information:
 - a. Line 1: Panelboard name.

- b. Line 2: Source from which the panelboard is fed.
- c. Line 3: Voltage, phase and wire configuration.
- d. Line 4: AIC rating of the panelboard.
- D. 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: Fuse or Circuit amperage and poles. Where fused disconnect is installed, denote the maximum fuse size to be installed.

3.3 LABEL INSTALLATION

- A. Conduit Feeder Labels Provide conduit labels on all feeder raceways as follows:
 - 1. Panelboards "PANEL xxxx FED FROM MDP".
- B. Spare Raceways: Provide raceway label on each individual raceway denoting the source and termination point at each end.

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 and lighting circuits, 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 lighting and 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.

3.7 PANELBOARD IDENTIFICATION

- A. Provide panelboard circuit directories in accordance with Section 26 24 16.
- B. Install one-line and panel map adjacent to the MDP.

END OF SECTION

SECTION 26 05 83 - WIRING CONNECTIONS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Electrical connections to equipment specified under other Sections.

1.2 RELATED WORK

- A. Division 01 Administrative Requirements; Summary: Owner-furnished equipment.
- B. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems.

1.3 REFERENCES

- A. FS W-C-596 Electrical Power Connector, Plug, Receptacle, and Cable Outlet.
- B. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 General Purpose Wiring Devices.
 - 2. NEMA WD 5 Specific-Purpose Wiring Devices.

1.4 SUBMITTALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.5 COORDINATION

- A. Division 01 Administrative Requirements: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORDS AND CAPS

- A. Straight-blade Attachment Plug: NEMA WD 1.
- B. Locking-blade Attachment Plug: NEMA WD 5.
- C. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.
- D. Cord Construction: Oil-resistant thermoset insulated Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp locations.
- E. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 PREPARATION

A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

3.3 INSTALLATION

- A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.
- B. Make conduit connections to equipment that is subject to vibration or movement using flexible conduit. Use Liquidtight flexible conduit in damp or wet locations.
- C. Install pre-finished cord set where connection with attachment plug is indicated or specified by the equipment manufacturer's installation instructions, or use attachment plug with suitable strain-relief clamps.
- D. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.
- E. Make wiring connections in control panel or in wiring compartment of pre-wired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where required.

- F. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches and connect with conduit and wiring as indicated in the equipment manufacturer's installation instructions.
- G. Where reconnecting existing equipment, extend connections using materials and methods compatible with existing electrical installations, or as specified.

3.4 ADJUSTING

A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lighting and Appliance Branch Circuit Panelboards.

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.

1.3 REFERENCES

- A. NEMA AB 1 Molded Case Circuit Breakers.
- B. NEMA KS 1 Enclosed Switches.
- C. NEMA PB 1 Panelboards.
- D. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- E. NEMA PB 2.2 Application Guide for Ground-fault Protective Devices for Equipment.
- F. UL 50 Enclosures for Electrical Equipment.
- G. UL 67 Panelboards.
- H. UL 98 Enclosed and Dead-front Switches.
- I. UL 489 Molded Case Circuit Breakers and Circuit Breaker Enclosures.
- J. 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 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.

1.6 OPERATION AND MAINTENANCE MATERIALS

- A. Submit data under provisions of Division 01 and Section 26 05 00.
- B. Provide product data and shop drawing information including replacement parts list.
- C. Provide installation, operation and maintenance information per manufacturer.
- D. Project record data: Submit final record panel schedules as hardcopy and in Microsoft Excel format.

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. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1. Boxes shall be galvanized steel constructed in accordance with UL50 requirements. Interiors shall be field convertible for top or bottom incoming feed. Main lug interiors up to 400 amperes shall be field convertible to main breaker. 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 door-in-door cover 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. Main/Sub Feed Circuit Breakers: NEMA AB 1; Provide vertical mount main and/or sub feed circuit breaker in panelboards as shown on the drawings.
 - 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. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.
 - 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.
- H. 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.

- 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 SWD for lighting circuits.
- 4. Provide circuit breakers UL listed as type HACR for use with heating, air conditioning and refrigeration equipment.
- 5. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

2.3 PANELBOARD IDENTIFICATION

- A. For each panelboard 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 designated by the Owner. Schedule shall not be typed with names shown on the Contract Drawings unless names are acceptable to the Owner.
- B. Provide panel schedule in O&M manual for every new panelboard and every existing panelboard where circuits are added or modified.
- C. 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.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
 - A. Wall Switches.
 - B. Receptacles.
 - C. 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 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 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 20 General-Use Snap Switches.
- F. UL 498 Attachment Plugs and Receptacles.
- G. 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.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Drawings: Indicate actual locations and mounting heights of all wiring devices on the project record drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - WALL SWITCHES

- A. Hubbell.
- B. Leviton.
- C. Pass & Seymour.
- D. Arrow Hart
- E. Substitutions: Under provisions of Division 01.

2.2 WALL SWITCHES

A. Wall Switches for Lighting Circuits: UL 20; NEMA WD 1; and Federal Specification FS W-S-896 AC industrial grade snap switch with toggle handle, rated 20 amperes and 120-277 volts AC. Handle: White nylon. Provide single-pole, 3-way, or 4-way switches as indicated on Plans.

2.3 ACCEPTABLE MANUFACTURERS - RECEPTACLES

- A. Hubbell.
- B. Leviton.
- C. Pass & Seymour.
- D. Arrow Hart
- E. Substitutions: Under provisions of Division 01.

2.4 RECEPTACLES

- A. Convenience and Straight-blade Receptacles: UL 498, NEMA WD 1 and Federal Specification FS W-C-596 industrial grade receptacle.
- B. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R, white nylon face.
- C. GFCI Receptacles: 20A, duplex convenience receptacle with integral class 'A' ground fault current interrupter, LED indicator lamp and integral lockout.
- D. Weather-Resistant Receptacles: Listed to the weather-resistant supplement of UL498 and complying with the requirements of NEC 406.9.

2.5 DEVICE PLATES

- A. Decorative Cover Plate: Smooth 430 or 302 stainless steel.
- 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.
- C. Exposed Work Cover Plate: ¹/₂ 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 wall switches 48 inches above floor, OFF position down.
- B. Unless otherwise noted install wall switches within 6 inches of the door jamb on the strike side.
- C. Install convenience receptacles 18 inches above floor.
- D. Unless otherwise noted, mounting heights are for finished floor to center line of outlet.
- E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- F. Install devices and wall plates flush and level.
- G. Ground receptacles to boxes with a grounding wire. Grounding through the yoke or screw contact is not an acceptable alternate to the ground wire.

END OF SECTION

SECTION 26 32 00 - PACKAGED GENERATOR ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Contractor designed and installed packaged, pre-wired, turnkey generator power distribution system and walk-in module. This is a performance type specification describing the minimum acceptable packaged engine generator system. The Contractor shall design and install the packaged engine generator system and power distribution system in accordance with the requirements of NFPA 70, NFPA 110 and IBC. The packaged engine generator and power distribution system and suggested locations and suggested dimensions, the final layout, location and dimensions of equipment and devices shall be solely determined by the Contractor and shall be in accordance with NFPA 70, NFPA 110 and IBC and shall be as a minimum consist of:
 - 1. Packaged engine generator systems.
 - 2. Generator mounted radiators.
 - 3. Exhaust silencers and fittings.
 - 4. Fuel fittings and sub-base fuel tank.
 - 5. Engine Mounted control panels.
 - 6. Batteries and chargers.
 - 7. Generator Module Building.
 - 8. Distribution and Branch Panels.

1.2 RELATED SECTIONS

- A. 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 33 Raceway and Boxes for Electrical Systems
- F. Section 26 24 16 Panelboards
- G. Section 26 27 26 Wiring Devices

H. Section 26 36 00 – Transfer switches.

1.3 REFERENCES

- A. ANSI/NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. ANSI/NEMA MG 1 Motors and Generators.
- C. ANSI/NFPA 70 National Electrical Code.
- D. ANSI/NEMA AB 1 Molded Case Circuit Breakers.
- E. UL 2200 Standard for Stationary Engine Generator Assemblies: The genset shall be listed to UL2200 or submitted to an independent third party certification process to verify compliance as installed.
- F. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- G. International Building Code (IBC), Chapter 16 Structural Design.
- H. ASCE 7-10

1.4 SYSTEM DESCRIPTION

- A. Engine generator system to provide source of standby power for entire facility.
- B. System Capacity: 250kW, 313 KVA, prime rating at elevation of 1000 feet above sea level, and ambient temperature between -40 and 104° F; using engine mounted radiator and load bank.
- C. Operation: In accordance with ANSI/NFPA 110.
- D. The Packaged Generator System, module and all dimensions, and performance data are based on Cummins model: DQDAA. The CONTRACTOR shall make all necessary modifications required for other manufactures, at no additional cost to the OWNER, if Cummins equipment is not supplied.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Submit shop drawings showing plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.
- C. Submit product data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, sub-base fuel day tank, remote radiator, and remote annunciator.

- D. Provide structurally engineered shop drawings as specified in Section 26 05 29 for seismic restraint of all equipment required by the 2015 IBC, Chapter 16 (1621). Equipment requiring structural shop drawings includes, but is not limited to the following: Generator Pad, Generator Module, Skid-mounted engine/generator, sub-base fuel tank, radiator, and vibration isolators. See plans for additional generator pad information.
- E. Submit shop drawings, product data and calculations for the walk-in enclosure, complete, including dimensioned layout of all equipment in plan view and elevation.
- F. Submit manufacturer's installation instructions under provisions of Division 01.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Division 01.
- B. Accurately record location of engine generator and mechanical and electrical connections.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 01.
- B. Include instructions for the following:
 - 1. Normal operation.
 - 2. Routine maintenance requirements, including replacement of filters.
 - 3. Starting battery inspection/maintenance.
 - 4. System coolant and other fluid inspection and replacement.
 - 5. Oil sampling and analysis for engine wear.
 - 6. Emergency maintenance procedures.
- C. Provide manufacturer's service manuals for all equipment, including but not limited to the following: Engine, generator, radiator, and fuel tank.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in packaged engine generator system with minimum three years documented experience.
- B. Supplier: Authorized distributor of engine generator manufacturer with service facilities within the State of Alaska.

1.9 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. Accept packaged engine generator set and accessories on site in crates and inspect for damage.
- D. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

1.10 WARRANTY

A. Provide two year, 6000 hour warranty under provisions of Division 01. The complete electrical power system (generator sets, controls, automatic transfer switches and associated switches and accessories, generator module) shall be warranted by the manufacturer against defects in materials and workmanship for a period of two years or 6000 hours, whichever occurs first from the date of beneficial occupancy. Warranty shall include parts, labor, travel expenses and labor to remove/reinstall equipment. There shall be no deductibles applied to the warranty.

1.11 MAINTENANCE SERVICE

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

1.12 EXTRA MATERIALS

- A. Submit maintenance materials under provisions of Division 01.
- B. Furnish one set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal tool box.
- C. Provide two additional sets of each fuel, oil, and air filter element required for the engine generator system.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Cummins (Basis of Design).
 - B. Caterpillar.
 - C. Kohler.

D. Substitutions: Under provisions of Division 01.

2.2 ENGINES

- A. Type: Water-cooled inline or V-type, four stroke cycle, compression ignition Diesel internal combustion engine.
- B. Rating: Sufficient to operate rated load at 10 percent overload for one hour at specified elevation and ambient limits.
- C. Fuel System: Appropriate for use of No. 1 (Arctic grade) fuel oil.
- D. Engine Speed: 1800 rpm.
- E. Governor: Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes.
- F. Safety Devices: Engine shutdown on high water temperature, high lube oil temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.
- G. 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 instructions. Include remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- H. Engine Jacket Heater: UL499 listed and labeled thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90° F, and suitable for operation on 120 volts AC.
- Radiator: Engine mounted radiator using 50/50 glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 100° F and freeze protection to -50 °F. Radiator Air Flow Restriction: 0.5 inches of water, maximum. Rotating parts shall be guarded against accidental contact.
- J. Engine Accessories:
 - 1. Oil Pump: Positive displacement, mechanical, full pressure, lubrication oil pump.
 - 2. Fuel Pump: An engine driven, mechanical, positive displacement fuel pump. Include fuel priming pump.
 - 3. Fuel filter with a replaceable spin-on canister element. Provide Racor #500FG or approved equal pre-filter, with water shutdown sensor tied to control panel.
 - 4. Replaceable dry element air cleaner with restriction indicator.
 - 5. Water pump.
 - 6. Lube oil cooler.

- 7. Lube Oil Drain: Extend the lube oil drain to the outside of the generator skid using Areoequip fittings. Install a Nibco T 113 shut off valve on the hose at an accessible location of the unit and cap the end of the hose with a ³/₄" NPT cap.
- K. Mounting: Provide unit with suitable spring-type vibration isolators and mount on structural steel base.

2.3 GENERATORS

- A. Generator: ANSI/NEMA MG 1; three phase, four pole, reconnectible brushless synchronous generator with brushless exciter.
- B. Rating: 250 kW, 313 kVA, at 0.8 power factor, 208Y/120 volts, 60Hz at 1800 rpm.
- C. Insulation: ANSI/NEMA MG 1, Class F.
- D. Temperature Rise: 105° C continuous.
- E. Enclosure: ANSI/NEMA MG 1; open drip proof.
- F. Voltage Regulation: Include generator-mounted volts per Hertz exciter-regulator to match engine and generator characteristics, with voltage regulation +/- one percent from no load to full load. Include manual controls to adjust voltage drop +/- 5 percent voltage level, and voltage gain.
- G. Frequency Regulation: Isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
- H. The diesel engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- I. 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 with not more than 3% in any single harmonic.
- J. Generator Leads: The generator leads shall be brought out and terminated on a unit-mounted generator circuit breaker. The generator leads shall have sufficient length to allow for any connection configuration.

2.4 GENERATOR MODULE

- A. Manufacturer: To be furnished as an integral unit, packaged, turnkey with generator by same supplier. For additional requirements see structural specifications.
- B. Structural Framing:

- 1. Framing consists of rolled structural shapes in accordance with ASTM-A36 specifications.
- 2. All connections shall be of all welded design in accordance with the International Building Code (IBC) latest edition and amendments.
- 3. The roof shall saddle type and slope in two directions.
- 4. All structural steel shall be primed with a marine alkyd primer proceeding fabrication. No top coat is applied.
- 5. Include a stairway with landing to access the walk-in enclosure.
- C. Exterior Composite Panels:
 - 1. Roof, Soffit and wall panels shall consist of 4" nominal polyurethane foam composite panels suitable of outdoor environments with suitable through fasteners.
 - 2. All panels shall feature tongue and groove joints tested in accordance with ASTM-E331 and ASTM-E283 for dust infiltration and water penetration. All Panel joints shall be foam to foam contact only eliminating frost creep, all voids in corners shall be foam filled.
 - 3. All panels shall be designed and approved to Factory Mutual (FM4880) and Class 1 fire rated construction. All panels shall be UL classified by UL subject 1040.
 - 4. Flame spread: 10
 - 5. Smoke development: 125
 - 6. R-value: 26(actual)
 - 7. Temperature range: -50° F to $+100^{\circ}$ F.
 - 8. Interior and exterior steel shall be of galvanized, G-90 finish, factory painted with baked on thermosetting silicone modified polyester coatings. Twenty year guarantee on finish. Color shall be white inside and exterior color shall match the surrounding buildings.
 - 9. Exterior doors shall be of freezer type complete with arctic grade seals and access hardware.
- D. Support Baseframe:
 - 1. The generator sets and all ancillaries shall be supported on the prefabricated steel base frame designed to withstand the forces of damage fatigue as a result of transportation and placement at site.
 - 2. There shall be two longitudinal wide flange beams provided as the main support positioned inward of the perimeter and to provide skidding as required. Additional thermal break between the rails and the enclosure shall be provided.

- 3. Floor plate shall consist of 3/16" diamond plate galvanized steel properly braced and stiffened to prevent "oil canning." All seams shall be stitch welded. At the Contractor's option an epoxy coated floor system may be used in lieu of the diamond plate.
- 4. Four lifting eyes shall be provided in relation to the center of gravity.
- E. Electrical:
 - 1. The following electrical components shall be supplied and installed in accordance with UL and the National Electric Code (NEC):
 - 2. 100 amp, 120/208V, 3-phase, 4W lighting and service panel complete with 100 amp main and required branch breakers. Panel to be fed from main distribution panel and be tagged "GEN".
 - 3. Electric unit heater with thermostat.
 - 4. Install LED fixtures as indicated on the drawings, low temperature driver, high impact acrylic diffuser and "damp location" listing to provide an average lighting level of 30 footcandles throughout the module. Provide light switch at entry to module for control interior lights.
 - 5. Emergency lighting to be provided via emergency battery pack ballasts inside the light fixtures. See drawings for fixture locations.
 - 6. A minimum of three interior duplex receptacles in addition to those required to operate the battery charger and engine block heater. A minimum of one GFCI protected exterior duplex receptacle with an "In-Use" listed weatherproof cover.
 - 7. All components shall be wired in accordance with Specification Sections 26 05 00, 26 05 19, and 26 05 33 and in compliance with the National Electrical Code.

F. Ventilation:

- 1. All motor operated dampers and motors shall be provided and pre-wired to a relay panel with controls.
- 2. All openings shall include weatherhoods and ³/₄" birdscreens. Coordinate hood locations and configuration with site and building layout. Intake openings shall be a minimum of 72" Above finished grade.
- 3. Motor operated intake dampers shall be provided to minimize thermal shock during winter and prevent snow infiltration. For summer operation, include motor operated dampers at the opposite side of the engine generator room to provide suitable cross flow ventilation.
- 4. Ventilation of the module shall be designed with a recirculating air plenum for the engine sized accordingly for the air flow requirements.
- 5. The temperature of the room shall be monitored by a thermostat which shall operate a modulating damper assembly which in turn shall be connected to the radiator discharge

and the recirculating air plenum. The plenum shall allow the warm air from the radiator discharge to enter back into the room to mix with incoming cold air.

- G. Heating:
 - 1. Electric unit heaters shall be provided to heat generator enclosure.
- H. Temperature Control System:
 - 1. Temperature controls shall be provided to operate electric unit heaters and generator dampers.

I. Insulation:

1. Insulate all ductwork, engine exhaust piping and muffler.

2.5 ACCESSORIES

- A. Sub-Base Tanks: Double-wall, all-welded construction, base-mounted fuel tank with a minimum capacity of 72Hrs. The tank outside dimensions shall not exceed the dimensions of the generator framework. The tank shall have foundation to ground clearance for visual secondary leak detection, shall have the structural integrity to support the engine-generator set, shall be supplied by the engine-generator set manufacturer, and shall be installed before shipment. The tank shall be UL 142 listed for both primary and secondary containment and shall meet all of the requirements of NFPA for the intended use. The tank shall have the following features; vent connections, tank-mounted fuel gauge, flexible fuel line connections, check valve, inlet solenoid valve, high and low fuel level alarm contacts and indicating lights. All appurtenances shall meet all state and local codes.
- B. Exhaust Silencers: Nelson Special "400" or approved supercritical type silencer, with a minimum overall attenuation level of 40 dB(A) and a maximum exhaust pressure drop not to exceed the engine manufacturer's recommendations at the rated engine exhaust gas flow rate and temperature. Provide with ANSI 150# companion flanges and flexible stainless steel exhaust fitting, suitable for horizontal orientation with side entry and end exit, sized in accordance with engine manufacturer's instructions. Dual exhaust engines shall be provided with one silencer similar to the above combining the two exhaust outlets into a single outlet
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, sized as recommended by the engine/generator set manufacturer for starting the set at 0°F ambient. Match battery voltage to starting system. Include necessary cables and clamps.
- D. Battery Trays: Non-metallic battery boxes with covers and hold-downs, treated for electrolyte resistance and constructed to contain spillage of electrolyte. Provide with seismic restraints to secure batteries during earthquakes. The battery housing shall be mounted outside the engine/generator skid base
- E. Battery Chargers: Dual-rate, 12-Amp, current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Provide overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Provide wall-mounted enclosure to meet

ANSI/NEMA 250, Type 1 requirements. 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.
- F. Line Circuit Breaker: NEMA AB 1 molded case circuit breaker on generator output with integral thermal and instantaneous magnetic 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. Mount unit in enclosure to meet ANSI/NEMA 250, Type 1 requirements.
- G. Engine-Generator Control Panel: NEMA 250, Type 1 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. Fuel pressure gauge.
 - 12. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.

- 13. Remote Alarm Contacts: Pre-wire SPDT contacts to terminal strip for remote alarm functions.
- 14. Overcrank protection with manual reset.
- 15. Trouble horn with silencing switch, red indicating light and reset switch.
- 16. Auxiliary Relay for Building Automation System Monitoring: Provide dry contact relays for monitoring of Generator Status and General Alarm by BAS. Coordination with Specification Section 23 09 23.
- H. Remote Annunciator Panels: Provide flush mounted 20-light LED type remote alarm annunciator panels with brushed stainless steel finish and alarm horn, located as shown on the Drawings. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 2 systems for the local generator control panel. Annunciator shall be labeled with the specified functions. Alarm silence and lamp test switches shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Alarm horn shall be switchable for all annunciation points. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel. Provide alarm horn, and indicators and alarms as follows:

Condition	Lamp Color	Audible Alarm
Genset Running	Green	No
Not in Auto	Red (Flashing)	Yes
High Battery Voltage	Red	Yes
Low Battery Voltage	Red	Yes
Charger AC Failure	Red	Yes
Fail to Start	Red	Yes
Low Engine Temperature	Amber	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Amber	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
Overcrank	Red	Yes
Emergency Stop	Red	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Amber	Yes
Network OK	Green	Yes
(4) Spares	Configurable	Configurable

- I. Low battery voltage lamp shall also be lighted for low cranking voltage or weak battery alarm.
- J. Heaters: Provide manufacturer's recommended heaters with thermostatic controls to keep engine oil pan, engine block, generator controls, and generator windings within manufacturer's

recommended temperature at 30°F. Provide immersion type coolant heater in remote radiator to keep radiator within manufacturer's recommended temperature at -20°F.

K. Mounting: The complete engine/generator package shall be mounted on a common, selfsupporting, low profile, structural steel skid base with rubber in shear vibration isolators between the engine and base and spring type vibration isolators with seismic snubbers between the base and the module. 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 a #1/0 awg copper grounding conductor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and field dimensions are as shown on Drawings.
- B. Verify that required utilities are available in proper location and ready for use.
- C. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Ground and bond generator and other electrical system components in accordance with NEC requirements.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Provide a (4) hour load tests utilizing a portable load bank. Simulate power failure including operation of each transfer switch, automatic starting cycle, and automatic shutdown, and return to normal. Demonstrate all automatic features as directed by the Owner's Representative. Load bank testing shall be done as follows:
 - 1. 1 hour at 50% rated load.
 - 2. 1 hour at 75% rated load.
 - 3. 2 hours at 100% rated load.
 - 4. 10 minutes at 110% rated load.
- C. During test, record the following at 20 minute intervals:
 - 1. Kilowatts.

- 2. Amperes.
- 3. Voltage.
- 4. Coolant temperature.
- 5. Room temperature.
- 6. Frequency.
- 7. Oil pressure.
- D. Test alarm and shutdown circuits by simulating conditions.
- E. Upon completion of the load bank test, provide a test under full available (building) load for 2 hours for witness by the Authority Having Jurisdiction and the Owner's Representative. Simulate power failures from ATS with load transfer and normal cool-down cycle. Record voltage, current, and frequency during building load test. Note any required adjustments. Furnish record of tests to the Owner.

3.4 MANUFACTURER'S FIELD SERVICES

A. Prepare, start, test, and adjust systems under provisions of Division 01.

3.5 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust generator output voltage and engine speed.

3.6 CLEANING

- A. Clean work under provisions of Division 01.
- B. Clean engine and generator surfaces. Replace oil and fuel filters.

3.7 DEMONSTRATION

- A. Provide systems demonstration under provisions of Division 01.
- B. Describe loads connected to standby system and restrictions for future load additions.
- C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 26 36 00 - 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 13 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 sections under Division 01 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; Automatic 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.
- 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

- A. Cummins/Onan.
- B. ASCO.
- C. Kohler.
- D. Caterpillar.
- E. Substitutions: Under provisions of Division 01.

2.2 AUTOMATIC TRANSFER SWITCH

- A. Description: NEMA ICS 2, UL 1008 listed 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. Closed Transition type:

- 1. The CTTS shall transfer the load without interruption (closed transition) by momentarily connecting both sources of power only when both sources are present and acceptable. The maximum interconnection time is 100 milliseconds. The CTTS shall operate as a conventional break-before-make (open transition) switch when the power source serving the load fails.
- 2. Source differential sensing shall be provided for the closed transition operating mode. The sensor shall enable transfer/re-transfer between live sources in the closed transition mode only when the two sources have a maximum voltage differential of 5%, frequency differential of 0.2 Hz and are within 5 electrical degrees.
- 3. Closed transition transfer shall be accomplished with no power interruption and without altering or actively controlling standby generator set.

2.3 SERVICE CONDITIONS

- A. Service Conditions: NEMA ICS 1.
- B. Operating Temperature: minus 40°F to plus 140°F.
- C. Altitude: 1,000 feet.

2.4 RATINGS

- A. Voltage: 208 volts, three phase, three wire, 60 Hz.
- B. Switched Poles: As noted on the drawings.
- C. Load Inrush Rating: Combination load.
- D. Continuous Rating: As noted on the Drawings.
- E. Interrupting Capacity: 250 percent of continuous rating.
- F. Withstand Current Rating: The switch shall be rated to withstand 65,000 Amps rms symmetrical short circuit current for 3 cycles. Withstand ratings requiring special breakers are not permitted.

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 provide 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 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. "REST/LAMP TEST" pushbutton that will clear any faults present in the control or simultaneously test all lamps on the panel by lighting them.
 - 6. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via the operator display panel.
 - 7. Security key switch or controller password protection to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless the ken is in place and operated.
 - 8. Analog AC meter display panel to display 3-phase AC Amps, 3-phase AC Volts, Hz, kW load level, and load power factor. The display shall be color-coded with green scale indicating normal or acceptable operating level, yellow indicating conditions nearing a fault and red indicating operation in excess of rated conditions for the transfer switch.
 - 9. LCD backlight 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. Display load data including 3-phase AC voltage, 3-phase AC current, frequency, kW, kVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.
- d. 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.
- e. 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.
- f. 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. Display fault history on the transfer switch including condition, date and time of fault. Faults shall include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, network battery voltage low, network communications error.
- G. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600 VAC. 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.
- 8. Monitoring the neutral current flow in the load side of the transfer switch. The control shall initiate an alarm when the neutral current exceeds a preset adjustable value in the range of 100 150% (set at 125%) of rated phase current for more than an adjustable time period of 10 to 60 seconds (set at 45 seconds).
- I. The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0 15 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.

- 3. 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 1. 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.

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 emergency/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. Electrical Specifications: Division 26.
 - 2. Motors and Connections: Division 26.
 - 3. 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, 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. At completion of project, deliver these drawings to the Architect 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.

1.7 OPERATING AND MAINTENANCE MANUALS

- A. Submit maintenance manuals to the Engineer covering all equipment, devices, etc. installed by the Contractor.
- B. 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. Written summary of instructions to Owner.
- 7. All manufacturers' warranties and guarantees.
- 8. Contractors Warranty Letter.
- C. 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 Architect/Engineer 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 Architect/Engineer 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 Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all 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 his 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 his 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 his 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 one year after acceptance by the 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 One Year Warranty.
 - 3. All Manufacturers' Guarantees.
 - 4. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing 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 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

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 Architectural, Structural, Civil and 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, 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 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.

END OF SECTION

SECTION 23 09 23 – DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Standard General Provisions Specification Sections, apply to this Section.
- B. Furnish an extension to the existing Johnson Controls system to monitor the required points in the new generator module.
- C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
- D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
- E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
- F. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
- G. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
- H. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
- I. Provide supervisory specialists and technicians at the job site to assist in system startup, and commissioning.
- J. Provide a comprehensive operator and technician training program as described herein.
- K. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
- L. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.

1.2 SYSTEM DESCRIPTION

- A. Distributed logic control systems complete with all software and hardware functions shall be provided and installed. All hardware and software necessary to monitor the new points shall be provided.
- B. Existing operator's workstation software shall be updated with new graphics and alarms.
- C. The system shall include remote notification services to allow messaging of critical alarms to owners' designated personnel and to the central alarm facility.

1.3 RELATED SECTIONS

- A. Section 23 05 00 Common Work Results For HVAC.
- B. Division 26 Electrical Specifications

1.4 QUALITY ASSURANCE

A. The direct digital control system provided shall be designed, furnished, installed, tested, certified and placed into service by a Control Contractor who is regularly engaged in the installation of direct digital control systems in Alaska. The Control Contractor shall maintain an office in Alaska with parts and maintenance personnel to ensure prompt response (24 hour maximum) to an emergency call during the one year correction period.

1.5 EQUIPMENT AND SHOP DRAWING REVIEW SUBMITTALS

- A. Provide electronic submittals in accordance with Section 23 05 00 and Division 01.
- B. Prior to programming, ordering of equipment, or installation of any portion of the system submit the following in a single tabbed and indexed PDF package for review by the Project Manager. The shop drawings shall include an electronic bookmark for every major system initial sheet. Shop drawings without bookmarks will be rejected without review for correction.
 - 1. System architecture diagram showing power supply to each component; interconnection of direct digital controllers, building management station, and peripherals; and indication of proposed location of direct digital controllers.
 - 2. Sequence of operations. Print sequence of operations on the schematic control diagrams so that the relevant sequence is on the same diagram with the control schematic it describes. The Sequence of Operations provided in the Contract Documents is written in directive language. Rewrite the sequence of operations to be submitted to the Owner in language that explains the sequences of operation. Remove all directives to the Contractor.
 - 3. Schematic control diagrams 11 inches by 17 inches minimum paper size with upper case lettering, minimum 1/16 inch high plotted from digitized files in AutoCAD format.

Clearly indicate wire and terminal labels, set points, reset schedules, switch over points, signal ranges, and other points required to completely describe the system. Show interface with any existing control systems. Depict circuitry on schematic control diagrams to allow circuits to be traced from connection to connection using one of the following methods:

- a. Diagram each wire depicting full length of circuit from connection to connection.
- b. Reference each wire to a uniquely labeled terminal. Depict terminals on a sequentially labeled terminal strip showing attached wires and the device labels of the components attached at the other end. If the wiring label used is different than the terminal label indicate the wire label. In addition provide ladder diagrams indicating current or air flow through circuitry components.
- c. Construct digitized schematic control diagrams using a symbol library so that symbols for similar equipment are common. Use separate layers or line type designations for the following items:
 - 1) Device Symbols.
 - 2) Equipment Symbols.
 - 3) Ductwork.
 - 4) Piping.
 - 5) Wiring.
- 4. Control Wiring Floor Plans. Provide architectural floor plans overlaid with control components. Plans shall include locations of sensors, valves, dampers, transformers, control cabinets, mechanical and electrical equipment interlocked or controlled by BAS, and communication and power wiring.
- 5. Subpanel and panel face layouts.
- 6. Control components data sheets, installation, operation, and adjustment instructions. Further index and tab this section of the submittal by item number.
 - a. Each control component shall be identified with a separate item number. Separate each item with a divider sheet with plastic index tabs.
 - b. Provide two alphabetical listings of all items included in the binder in an index at the front of the binder. One index shall list items by functional name. The other index shall list items by symbol used in the control diagrams.
 - c. Each sheet or page shall indicate the specific item(s) proposed for this project. Delete or cross out all other items.
- 7. Control Transformer Schedule. Provide control transformer schedule indicating tag id, location, equipment serviced, and VA consumed. Transformers shall be UL listed, class

2 power limited, provide built in circuit breaker and have a minimum of 15% spare capacity.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Provide electronic operations and maintenance manuals in accordance with Section 23 05 00 and Division 01 Standard General Provisions.
- B. Operation and Maintenance Manuals must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for final or substantial completion inspection will be considered by the Project Manager.
- C. The Operation and Maintenance Manual shall include the information required for the equipment review submittal, updated as required to reflect current as-built conditions, plus the following:
 - 1. A brief customized guide to system operation prepared for the proprietary programming and interfacing software.
 - 2. Complete system as-built wiring diagrams indicating the following:
 - a. Wiring for all control and power circuits indicating the voltage and breaker location for each circuit.
 - b. Wiring for direct digital controllers and interface panels.
 - c. Terminal number or code name for terminals in direct digital controllers and interface panels with unused terminals marked "spare".
 - d. Assigned name, address, and engineering units for direct digital controller input and output terminals.
 - 3. Control Wiring Floor Plans. Provide architectural floor plans overlaid with control components. Plans shall include locations of sensors, valves, dampers, transformers, control cabinets, mechanical and electrical equipment interlocked or controlled by BAS, and communication and power wiring.
 - 4. Control Transformer Schedule. Provide control transformer schedule indicating tag id, location, equipment serviced, and VA consumed.
 - 5. List of software with current revision numbers, vendor name and support telephone numbers.
 - 6. Include copies of programming and variable printouts for the direct digital control logic created to fulfill the sequence of operation requirements. Include the following information:
 - a. Print the sequence of operation corresponding to the program listing on that page.

- 7. Provide backup copy of programming and graphics for the direct digital control system with instructions on how to install the backup software if the system needs to be re-installed. Provide on USB drive.
- 8. Provide digitized copies of O & Ms, as built schematic control diagrams, wiring diagrams, and graphic screens recorded on USB drive in PDF drawing format.
- 9. Provide a print out of the configuration files for each controller. Place controller specific print out in specific controller cabinet.
- 10. Provide other information required for the Owner to properly troubleshoot and maintain the control system.
- D. After the final inspection and subsequent punch list inspections update each copy of the Operation and Maintenance Manual to reflect final as-built conditions.

1.7 SYSTEMS DEMONSTRATION

- A. The Contractor will completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operation.
- B. Provide complete demonstration of system operation to the owner's representative at the project substantial completion inspection. The Contactor will demonstrate to the Owner's satisfaction that all equipment and systems operate in accordance with the sequence of operation. Demonstration will include all equipment controlled by the Direct Digital Control System under the scope of this project.
- C. Building management station demonstration will consist of:
 - 1. Running sample point log and system configuration reports as requested.
 - 2. Display and demonstrate each data entry to show site specific customizing capability. Demonstrate parameter changes.
 - 3. Step through penetration tree, display all graphics, demonstrate dynamic update and direct access to graphics.
 - 4. Execute system commands in graphic mode including operation of control system set points, schedules, valves, dampers and control relays. Commands shall be executed as necessary to demonstrate the system is controlling in accordance with the sequence of operations.
 - 5. Demonstrate update, and alarm responsiveness.
 - 6. Demonstrate digital system configuration graphics with interactive upload and download, and demonstrate specified diagnostics.

1.8 WARRANTY

- A. Under provisions of Division 01 Standard General Provisions.
- B. All components, system software, parts and assemblies will be guaranteed against defects in materials and workmanship for one year from acceptance date.
- C. Labor to troubleshoot, repair, reprogram, or replace system components will be furnished by the Contractor at no charge to the owner during the warranty period.
- D. All corrective software modifications made during warranty service periods will be updated on user documentation and on user and manufacturer archived software.

1.9 SUBSTANTIAL INSPECTION SUPPLEMENTAL DATA

A. Substantial inspection supplemental data must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for substantial completion inspection will be considered by the Project Manager.

PART 2 - PRODUCTS

2.1 APPROVED BUILDING AUTOMATION SYSTEMS

- A. Johnson Controls, Inc., or approved equal.
- 2.2 SENSORS
 - A. General:
 - 1. Provide sensors with specified output type for remote sensing of temperature, level, and status. Factory calibrate for the specific application.
 - 2. Provide two or three wire sensors and transmitters. Whenever transmitters are indicated or are required as part of sensor provide transmitters with 0-10VDC or 4-20ma signal output.
 - B. Space Temperature:
 - 1. Thermistor or RTD with minimum 32-150 deg F range, accuracy of plus or minus 0.4 deg F over full range, and maximum drift of 0.1 deg F/year. Removable covers with tamper proof fasteners.
 - C. Fluid Temperature:
 - 1. Thermistor or RTD with minimum 30 deg F to 230 deg F range, accuracy of plus or minus 1.0 deg F over full range, and maximum drift of 0.5 deg F per year.

2. Provide threaded well to allow removal of element without draining system.

2.3 SWITCHES

- A. Current Operated Switches:
 - 1. Provide current sensing relays for status of motors as called out in sequence of operation. Provide with field adjustable current setpoint range suitable for application. Adjust sensor for equipment current draw. Veris or equal.
 - 2. Internal circuits powered by induced line current.

2.4 TRANSMITTERS

- A. Temperature Transmitter:
 - 1. Two or three wire transmitter, with adjustable setpoint, and selectable range. Select range with mid-range at setpoint.
 - 2. Accuracy, 0.1F or 0.2 percent of span.
 - 3. Optional LED display.

2.5 CONTROL RELAYS

- A. General: Provide relays rated for current and voltage requirements of controlled equipment.
- B. Panel Mounted Relays:
 - 1. Plug in type, with DIN rail mountable plug in sockets. IDEC RH series or equal.
 - 2. UL listed.
- C. Field Mounted Relays:
 - 1. Solid state packaged relay including relay, LED indicator, provisions for mounting, transient protection and housing. Functional Devices RIB T series or equal.
 - 2. Provide with a Hand-Off-Auto switch.
 - 3. Provide internal separation between class 1 and class 2 wiring including separate wire ways or nipples.
 - 4. UL listed.

2.6 WIRING AND RACEWAYS

- A. Provide wiring and raceway complying with the National Electrical Code, Division 26, and State and Local Codes and Ordinances.
- B. Provide wiring and raceway complying with the National Electrical Code, and State and Local Codes and Ordinances.
- C. Raceways:
 - 1. EMT, metal duct, or IMC in the generator module. No exposed wiring is allowed.
 - 2. Provide rigid steel conduit raceways when raceway is buried or embedded in concrete.
 - 3. Provide 18 inches minimum to 36 inches maximum flexible metal conduit of galvanized steel construction for final connection to control devices. For connections to pipe mounted devices, and to devices in damp, wet, or exterior locations, or in mechanical rooms containing boilers or steam converters, provide oil-resistant liquid-tight flexible metal conduit.
 - 4. Provide EMT connectors with rain tight compression fittings and insulated throats.
 - 5. Wire mould is not allowed.
- D. Wiring:
 - 1. Provide wire with copper stranded conductors. Provide color or number coded jackets.
 - 2. Low voltage wiring from control components to input/output modules: 20 gauge minimum foil-shielded cable rated 100 VDC at 80 deg C.
 - 3. Provide plenum rated cable whenever wire is run without conduit.
 - 4. Provide communications network wiring meeting the gauge, impedance, capacitance, resistance and shielding requirements specified by the manufacturer of the connected devices.
 - 5. Identify wires and cables with permanent self-laminating machine print labeling system. Provide labels capable of receiving 8 characters of type written text, with minimum print on area of 1 inch by 1/2 inch, and protected by a clear sheath. Thomas & Betts E-Z Code or equal.
 - 6. Support or bundle wire with self locking, UL listed cable ties. Provide 40 lb rated cable ties incorporating a stainless steel locking insert. Provide UL 94V-0 flammability rated, halar cable ties when installed without panel enclosure. Thomas & Betts Ty-Rap or equal.
 - 7. Provide cable tie anchors designed for mechanical anchoring, allowing removal of cable tie without removal of anchor, capable of accepting at a minimum a number 8 screw.

Adhesive cable tie anchors are allowed only on the interior surface of panel doors. Panduit TM series or equal.

2.7 PANELS

- A. General: Investigate potential reuse of existing panel enclosures, Otherwise locate new panels in same locations these panel were located.
 - 1. UL listed, not over 24 inches wide by 42 inches high, constructed of 14 U.S.S gauge steel except that enclosures less than 20 inches in both dimensions may be 16 gauge. Provide multi-section or multiple individual panels as required. Hoffman or equal.
 - 2. Equipped with subpanels.
 - 3. Punched or stamped when needed to receive front mounted switches, gauges, indicating lights and alarms.
 - 4. Secure to the front of every control panel that has more than one source of power the following warning label: The word "WARNING" shall be in 1 inch high letters. Other letters shall be 1/4 inch high.
 - a. WARNING Complete de-energization of this control panel requires that circuit breakers supplying all equipment controlled by this panel be opened.
 - 5. Provide track mounted terminals with integral permanent labeling system. Integral screws for securing connected wires. Voltage and amperage ratings to match terminated wire ratings. Marathon or equal.
 - 6. Provide nylon insulated crimp connectors with voltage and amperage rating matching connected wire ratings unless terminal strip is designed to connect to connected wire type without using a crimp connector. Thomas & Betts STA-KON connectors or equal.
 - 7. Indicating lamps on panel shall be long life type, rated for a minimum life of 10,000 hours.
- B. Interior Enclosures:
 - 1. Piano hinged front with latch and lock.
 - 2. Baked enamel finish.
 - 3. Concealed enclosures may be standard electrical boxes.

2.8 FIRESTOPPING

Capable of maintaining an effective barrier against flame, heat, and smoke. Metalines, Dow, 3M, or equal.

- B. Provide installations classified in Underwriter's Laboratories (UL) Building Materials Directory or listed in the Warnock Hersey International Directory.
- C. Paintable where exposed to view.
- D. Waterproof in plumbing chases.
- E. Provide the product of more than one manufacturer if required to provide listed installations throughout.

PART 3 - EXECUTION

3.1 GENERAL

- A. Modify and add existing control system devices as indicated. Connect new sensors to the existing Johnson Controls automation system so inputs can be monitored and alarmed on the existing operator workstation. Extend and modify the existing wiring and control system power source to accommodate indicated direct digital control system devices.
- B. Before beginning installation of new system components, test the existing system devices that are being reused in modified control systems for proper operation and report any devices in need of replacement or repair to the Project Manager. At the option of the Project Manager, he will issue a contract amendment to replace or repair the defective devices or he will have Owner maintenance personnel replace or repair the defective devices. The Contractor shall be responsible for providing new devices to replace existing devices that are not brought to the Project Manager's attention before beginning installation of new system components.
- C. Work must comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards. Perform work by persons qualified to produce workmanship of specified quality. If required by the State of Alaska workers shall be licensed. If requested provide copy of license.
- D. Do not install control devices in locations where they are subject to damage or malfunction due to normally encountered ambient temperatures.
- E. Schematics and diagrams, when indicated on the Drawings, show approximate functional relationships and sequences only. All required devices are not shown. Contractor is responsible for providing all components required for a complete functioning system selected to meet the specific functional requirements of each application.
- F. Hard wire control devices. Do not use power line carriers.
- G. Ensure that the direct digital controller network, and power wiring will support both a 15 percent increase in network length, and a 10 percent increase in controllers similar to those installed without having to add additional network repeaters, increase power wire size or circuit breaker capacity.

- H. Unless indicated otherwise, connect the primary sensing input and the associated output for each control loop to the same controller. A secondary or resetting input may be attached to any controller and communicated over the network.
- I. After the final inspection and subsequent punch list inspections provide wiring schematic and Control Drawings with written sequence of operations, 11 inches by 17 inches in size, produced from the as-built Control Drawings. Provide one copy in each Operation and Maintenance Manual, and one copy, at its applicable control panel. Provide a complete facility-wide system backup on USB drive to restart and reload all programmable devices used in the control system.
- J. Label control devices mounted in the field and within control cabinets with 1/4 inch high white embossed letters and black tape background. Dymo or equal. Tags to match tags used on Control Drawings.

3.2 DEMOLITION

- A. Remove existing operators, sensors, and controllers that are replaced by new devices or that are not reused. Present all removed equipment to owner for first right of refusal before disposing of equipment. Review copy of existing system "As-Built" control schematics for existing device location and extent of required demolition.
- B. Patch holes in existing ductwork at removed sensors that are not reused with sheet metal patches of equal gauge or heavier material sheet metal that are seal airtight with adhesive and then screwed or pop riveted to the ductwork.
- C. Existing conduit and wiring may be reused when available and when wiring is rated for application. Remove existing unused conductors.
- D. Repairs: Any portion of the facility damaged, cut back or made inoperable shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Project Manager.

3.3 WIRING AND RACEWAYS

- A. Permanently label electrical or electronic wiring at each end indicating location and the device at opposite end. At the direct digital controller end use either the I/O address, if it describes the connected device, or the unique control device tag used on the control schematics. At the device end indicate both the terminal number and the controller connected at the other end. For color coded multi-conductor cable, label cable sheath not individual conductors.
- B. At field devices where conductors are not wired to terminal strips wire using a unique color for each conductor connected to that device.
- C. Install wiring in a neat and orderly manner generally running along building lines.
- D. Support low voltage wiring run without conduit at a maximum of 4 feet between anchors.

- E. Seal conduit penetrations at floor and wall penetrations with firestopping installed as indicated. Note that this applies to all floor and wall penetrations, not just fire barrier penetrations. At all mechanical rooms or other rooms containing floor drains, except those with slab on grade floors, make penetration watertight and extend sleeve 3 inches above the floor.
- F. Wire all electrical controls and switches furnished under this Section of the Specifications.
- G. Make wire connections using factory fabricated jack assemblies, terminal strips, or solder connections. Use crimp connectors on stranded wire unless connecting to terminal strips approved for direct stranded wire connection. Insulate solder connections with heat shrink tubing. Field connections in control power wiring circuits may be made using wire nuts.
- H. Avoid splices in signal wire, where unavoidable connect with solder connections and label on each side of splice. Use identical wire type and color on each side of splice.
- I. Conceal wiring in finished areas. Unless otherwise noted, install wiring inside conduit or fully enclosed metallic raceway.
- J. Low voltage wiring installed in concealed accessible locations may be run without conduit. Sleeve wiring at wall penetrations.
- K. Metal raceways crossing expansion joints make provision for 3 way movement. For conduits 1 & 1/2 inch and larger use O-Z type DX fittings, or equal.
- L. At raceway penetrations of the vapor barrier provide a double splice patch (one on each side of vapor barrier) by cutting a square piece of vapor barrier 12 inches larger on all sides than the pipe. Cut a round hole in the center of the square splice patch, smaller than the pipe, to form a stretched fit. Force the pipe through the splice patch and tape all sides to the vapor barrier and seal the vapor barrier to the pipe at the penetration with an adhesive compatible with the vapor barrier material.
- M. Securely seal at both ends, raceways running from a warm area to a cold area. Ductseal or equal.
- N. Install all wiring in accordance with National Electrical Code, and State and Local Codes and Ordinances.

3.4 PANELS

A. Provide UL listed panel assemblies when required by local authorities.

3.5 SENSORS AND SWITCHES

A. Mount room sensors 48 inches above finished floor, with any operable portion no higher than 48 inches, unless otherwise indicated. Where adjacent to light switches mount at same height as switches to provide a clean horizontally aligned installation unless doing so requires the operable portion to be above 48 inches. For sensors with tamper proof guards, sensors may be mounted between 48 inches and 60 inches above finished floors.

- B. Fill immersion fluid temperature sensor wells with heat conducting compound. At 1-1/2 inches and smaller piping install wells in pipe tees one size larger than line size.
- C. Provide sensors and thermostats installed on exterior surfaces with insulated bases such that actual room temperature not wall surface temperature is sensed.

3.6 CONTROL POWER SUPPLY

- A. Provide electric power to control devices from control system power circuit or from device or equipment being controlled.
- B. Carry a dedicated ground wire to controllers from the associated breaker panel. Do not use the conduit system for grounding purposes.

3.7 TESTING AND ADJUSTING

- A. Upon completion of the installation, the contractor shall initiate operation of the control system and perform all necessary testing and diagnostics to ensure proper operation. A formal commissioning procedure shall be utilized to insure complete system integrity and conformance to these specifications. This procedure shall consist of two separate steps incorporating point verification and program verification. Commissioning forms shall address all field devices, field controllers, software statements, and software points.
- B. Verify correct installation and wiring of all points.
- C. Confirm that all devices are installed correctly. Verify that terminations are tight and of correct polarity. Document and signoff the results on Point Verification form.
- D. Verify that all points are wired to the correct termination block at the control panel by verifying continuity between the device and the panel termination. Document and signoff results on Point Verification form. Verify that each sequence performs as specified in contract documents. Tune each loop as required for proper operation.
- E. Document and signoff the results on Program Verification form.
- F. Activate all digital input sensors and confirm proper point status at the panel. Measure conditions at all analog input sensors with an independent reference device, calibrate as required, and confirm proper point status at the panel. Document and signoff the results on Point Verification form.
- G. Deficiencies revealed by failed test(s) shall be repaired and corrected and the test(s) repeated until successful.
- H. Provide Substantial inspection data to consist of the following as a minimum:
 - 1. Provide signed off Point Verification commissioning forms to mechanical engineer and owner prior to owner acceptance walkthrough.

- 2. Provide signed off Point Verification forms indicated the correct execution of all sequence of operations for each piece of equipment. List test procedure and results.
- 3. Point logs indicated point values with time and date stamp.

3.8 DATABASE ARCHIVAL AND UPGRADE

A. Provide a complete database backup USB drive for the building management system and each direct digital controller to the Owner at final inspection. If software modifications are required during the warranty period update USB drive.

3.9 SEQUENCE OF OPERATION

- 1. Digital Control and Monitoring
 - a. Generator Operating Temperature
 - b. Generator Enclosure Temperature
 - c. Day Tank Fuel Level
 - d. Generator On/Off Status
- 2. Alarms
 - a. Generator Over Temperature
 - b. Low Space Temperature
 - c. High Space Temperature
 - d. Day Tank Low Fuel Level
 - e. Generator Running
- 3. Transmit alarms to the operator workstation and to the same remote alarm notifications that are presently in the system.

3.10 SUBSTANTIAL INSPECTION REQUIREMENTS

- A. Substantial inspection data must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for final or substantial completion inspection will be considered by the Project Manager.
- B. Prior to the substantial inspection, review and test entire installation for conformance with contract documents. Test shall include thorough field check of sequence of operations for each system and piece of equipment including simulation of all possible modes of operation. With the call for inspection, verify in writing that this system review and test has been performed and anything not conforming to contract documents shall be so noted.
- C. During the Substantial inspection Contractor personnel shall provide on-site assistance to inspection personnel required for a complete and thorough inspection.
- D. During the Substantial inspection Contractor personnel shall demonstrate that the control system performs in accordance with the contract documents. Provide material and personnel required to perform the demonstration.

END OF SECTION

SECTION 23 11 13 - FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Fuel Oil Piping Above Ground.
- B. Unions and Flanges.
- C. Pipe Hangers and Supports.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. National Fire Protection Association:
 - 1. NFPA 30 Flammable and Combustible Liquids Code.
 - 2. NFPA 31 Standard for the Installation of Oil-Burning Equipment.
- C. Underwriters Laboratories Inc.:
 - 1. UL 567 Pipe Connectors for Flammable Liquids and Combustible Liquids and LP-Gas.

1.3 SUBMITTALS

- A. Submittal Procedures under provisions of the Division 01.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
 - 3. Fuel Piping Specialties: Submit manufacturer's catalog information including capacity, rough-in requirements, and service sizes.
- C. Test Reports: Submit written test results for piping system pressure test.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves, piping system, and system components.
- B. Project Record Documents: Record actual locations of piping mains with invert elevations, valves, manholes, and leak detection and location system.
- C. Operation and Maintenance Data under provisions the Division 01. Submit spare parts lists, exploded assembly views, for tank and inventory leak detection.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 31.
- B. Perform Work in accordance with authority having jurisdiction.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum three years documented experience or approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle under the provisions of the Division 01.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 COORDINATION

A. Under the provisions of the Division 01.

1.10 WARRANTY

A. Under the provisions of the Division 01.

PART 2 - PRODUCTS

2.1 FUEL OIL PIPING - ABOVE GROUND

- A. Steel Pipe: ASTM A53/A53M or ASME B36.10M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M wrought carbon steel and alloy steel welding type.
 - 2. Joints Exterior: Welded or Viega MegaPress.
 - 3. Joints in Mechanical Room: Threaded for pipe 2 inch and smaller or Viega MegaPress.

2.2 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 HANGERS AND SUPPORTS

- A. Conform to NFPA 31.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

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.
- 3.2 INSTALLATION PIPE HANGERS AND SUPPORTS
 - A. Install hangers and supports in accordance with ASTM F708 and MSS SP 89.
 - B. Support horizontal piping hangers as scheduled.

- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- F. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

3.3 INSTALLATION - ABOVEGROUND PIPING

- A. All piping no longer used shall be demolished.
- B. Install fuel oil piping in accordance with NFPA 31.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install fire stopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Division 07.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer. Refer to Division 09.
- I. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Division 09.
- J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

END OF SECTION

SECTION 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. Electrical Specifications: Division 26.
 - 2. Motors and Connections: Division 26.
 - 3. 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, 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. At completion of project, deliver these drawings to the Architect 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.

1.7 OPERATING AND MAINTENANCE MANUALS

- A. Submit maintenance manuals to the Engineer covering all equipment, devices, etc. installed by the Contractor.
- B. 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. Written summary of instructions to Owner.
- 7. All manufacturers' warranties and guarantees.
- 8. Contractors Warranty Letter.
- C. 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 Architect/Engineer 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 Architect/Engineer 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 Contractor shall pay for any inspection fees or other fees and charges required by ordinance, law, codes and these specifications.

1.13 TESTING

A. The Contractor under each section shall at his own expenses perform the various tests as specified and required by the Architect and as required by applicable code, the State and local authorities. The Contractor shall furnish all 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 his 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 his 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 his 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 one year after acceptance by the 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 One Year Warranty.
 - 3. All Manufacturers' Guarantees.
 - 4. Operation and Maintenance Manuals.

1.19 INSPECTION OF SITE - REMODEL PROJECTS

A. The accompanying plans do not indicate completely the existing 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 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

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 Architectural, Structural, Civil and 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, 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 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.

END OF SECTION

SECTION 23 09 23 – DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Standard General Provisions Specification Sections, apply to this Section.
- B. Furnish an extension to the existing Johnson Controls system to monitor the required points in the new generator module.
- C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
- D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
- E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
- F. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
- G. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
- H. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
- I. Provide supervisory specialists and technicians at the job site to assist in system startup, and commissioning.
- J. Provide a comprehensive operator and technician training program as described herein.
- K. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
- L. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.

1.2 SYSTEM DESCRIPTION

- A. Distributed logic control systems complete with all software and hardware functions shall be provided and installed. All hardware and software necessary to monitor the new points shall be provided.
- B. Existing operator's workstation software shall be updated with new graphics and alarms.
- C. The system shall include remote notification services to allow messaging of critical alarms to owners' designated personnel and to the central alarm facility.

1.3 RELATED SECTIONS

- A. Section 23 05 00 Common Work Results For HVAC.
- B. Division 26 Electrical Specifications

1.4 QUALITY ASSURANCE

A. The direct digital control system provided shall be designed, furnished, installed, tested, certified and placed into service by a Control Contractor who is regularly engaged in the installation of direct digital control systems in Alaska. The Control Contractor shall maintain an office in Alaska with parts and maintenance personnel to ensure prompt response (24 hour maximum) to an emergency call during the one year correction period.

1.5 EQUIPMENT AND SHOP DRAWING REVIEW SUBMITTALS

- A. Provide electronic submittals in accordance with Section 23 05 00 and Division 01.
- B. Prior to programming, ordering of equipment, or installation of any portion of the system submit the following in a single tabbed and indexed PDF package for review by the Project Manager. The shop drawings shall include an electronic bookmark for every major system initial sheet. Shop drawings without bookmarks will be rejected without review for correction.
 - 1. System architecture diagram showing power supply to each component; interconnection of direct digital controllers, building management station, and peripherals; and indication of proposed location of direct digital controllers.
 - 2. Sequence of operations. Print sequence of operations on the schematic control diagrams so that the relevant sequence is on the same diagram with the control schematic it describes. The Sequence of Operations provided in the Contract Documents is written in directive language. Rewrite the sequence of operations to be submitted to the Owner in language that explains the sequences of operation. Remove all directives to the Contractor.
 - 3. Schematic control diagrams 11 inches by 17 inches minimum paper size with upper case lettering, minimum 1/16 inch high plotted from digitized files in AutoCAD format.

Clearly indicate wire and terminal labels, set points, reset schedules, switch over points, signal ranges, and other points required to completely describe the system. Show interface with any existing control systems. Depict circuitry on schematic control diagrams to allow circuits to be traced from connection to connection using one of the following methods:

- a. Diagram each wire depicting full length of circuit from connection to connection.
- b. Reference each wire to a uniquely labeled terminal. Depict terminals on a sequentially labeled terminal strip showing attached wires and the device labels of the components attached at the other end. If the wiring label used is different than the terminal label indicate the wire label. In addition provide ladder diagrams indicating current or air flow through circuitry components.
- c. Construct digitized schematic control diagrams using a symbol library so that symbols for similar equipment are common. Use separate layers or line type designations for the following items:
 - 1) Device Symbols.
 - 2) Equipment Symbols.
 - 3) Ductwork.
 - 4) Piping.
 - 5) Wiring.
- 4. Control Wiring Floor Plans. Provide architectural floor plans overlaid with control components. Plans shall include locations of sensors, valves, dampers, transformers, control cabinets, mechanical and electrical equipment interlocked or controlled by BAS, and communication and power wiring.
- 5. Subpanel and panel face layouts.
- 6. Control components data sheets, installation, operation, and adjustment instructions. Further index and tab this section of the submittal by item number.
 - a. Each control component shall be identified with a separate item number. Separate each item with a divider sheet with plastic index tabs.
 - b. Provide two alphabetical listings of all items included in the binder in an index at the front of the binder. One index shall list items by functional name. The other index shall list items by symbol used in the control diagrams.
 - c. Each sheet or page shall indicate the specific item(s) proposed for this project. Delete or cross out all other items.
- 7. Control Transformer Schedule. Provide control transformer schedule indicating tag id, location, equipment serviced, and VA consumed. Transformers shall be UL listed, class

2 power limited, provide built in circuit breaker and have a minimum of 15% spare capacity.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Provide electronic operations and maintenance manuals in accordance with Section 23 05 00 and Division 01 Standard General Provisions.
- B. Operation and Maintenance Manuals must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for final or substantial completion inspection will be considered by the Project Manager.
- C. The Operation and Maintenance Manual shall include the information required for the equipment review submittal, updated as required to reflect current as-built conditions, plus the following:
 - 1. A brief customized guide to system operation prepared for the proprietary programming and interfacing software.
 - 2. Complete system as-built wiring diagrams indicating the following:
 - a. Wiring for all control and power circuits indicating the voltage and breaker location for each circuit.
 - b. Wiring for direct digital controllers and interface panels.
 - c. Terminal number or code name for terminals in direct digital controllers and interface panels with unused terminals marked "spare".
 - d. Assigned name, address, and engineering units for direct digital controller input and output terminals.
 - 3. Control Wiring Floor Plans. Provide architectural floor plans overlaid with control components. Plans shall include locations of sensors, valves, dampers, transformers, control cabinets, mechanical and electrical equipment interlocked or controlled by BAS, and communication and power wiring.
 - 4. Control Transformer Schedule. Provide control transformer schedule indicating tag id, location, equipment serviced, and VA consumed.
 - 5. List of software with current revision numbers, vendor name and support telephone numbers.
 - 6. Include copies of programming and variable printouts for the direct digital control logic created to fulfill the sequence of operation requirements. Include the following information:
 - a. Print the sequence of operation corresponding to the program listing on that page.

- 7. Provide backup copy of programming and graphics for the direct digital control system with instructions on how to install the backup software if the system needs to be re-installed. Provide on USB drive.
- 8. Provide digitized copies of O & Ms, as built schematic control diagrams, wiring diagrams, and graphic screens recorded on USB drive in PDF drawing format.
- 9. Provide a print out of the configuration files for each controller. Place controller specific print out in specific controller cabinet.
- 10. Provide other information required for the Owner to properly troubleshoot and maintain the control system.
- D. After the final inspection and subsequent punch list inspections update each copy of the Operation and Maintenance Manual to reflect final as-built conditions.

1.7 SYSTEMS DEMONSTRATION

- A. The Contractor will completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operation.
- B. Provide complete demonstration of system operation to the owner's representative at the project substantial completion inspection. The Contactor will demonstrate to the Owner's satisfaction that all equipment and systems operate in accordance with the sequence of operation. Demonstration will include all equipment controlled by the Direct Digital Control System under the scope of this project.
- C. Building management station demonstration will consist of:
 - 1. Running sample point log and system configuration reports as requested.
 - 2. Display and demonstrate each data entry to show site specific customizing capability. Demonstrate parameter changes.
 - 3. Step through penetration tree, display all graphics, demonstrate dynamic update and direct access to graphics.
 - 4. Execute system commands in graphic mode including operation of control system set points, schedules, valves, dampers and control relays. Commands shall be executed as necessary to demonstrate the system is controlling in accordance with the sequence of operations.
 - 5. Demonstrate update, and alarm responsiveness.
 - 6. Demonstrate digital system configuration graphics with interactive upload and download, and demonstrate specified diagnostics.

1.8 WARRANTY

- A. Under provisions of Division 01 Standard General Provisions.
- B. All components, system software, parts and assemblies will be guaranteed against defects in materials and workmanship for one year from acceptance date.
- C. Labor to troubleshoot, repair, reprogram, or replace system components will be furnished by the Contractor at no charge to the owner during the warranty period.
- D. All corrective software modifications made during warranty service periods will be updated on user documentation and on user and manufacturer archived software.

1.9 SUBSTANTIAL INSPECTION SUPPLEMENTAL DATA

A. Substantial inspection supplemental data must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for substantial completion inspection will be considered by the Project Manager.

PART 2 - PRODUCTS

2.1 APPROVED BUILDING AUTOMATION SYSTEMS

- A. Johnson Controls, Inc., or approved equal.
- 2.2 SENSORS
 - A. General:
 - 1. Provide sensors with specified output type for remote sensing of temperature, level, and status. Factory calibrate for the specific application.
 - 2. Provide two or three wire sensors and transmitters. Whenever transmitters are indicated or are required as part of sensor provide transmitters with 0-10VDC or 4-20ma signal output.
 - B. Space Temperature:
 - 1. Thermistor or RTD with minimum 32-150 deg F range, accuracy of plus or minus 0.4 deg F over full range, and maximum drift of 0.1 deg F/year. Removable covers with tamper proof fasteners.
 - C. Fluid Temperature:
 - 1. Thermistor or RTD with minimum 30 deg F to 230 deg F range, accuracy of plus or minus 1.0 deg F over full range, and maximum drift of 0.5 deg F per year.

2. Provide threaded well to allow removal of element without draining system.

2.3 SWITCHES

- A. Current Operated Switches:
 - 1. Provide current sensing relays for status of motors as called out in sequence of operation. Provide with field adjustable current setpoint range suitable for application. Adjust sensor for equipment current draw. Veris or equal.
 - 2. Internal circuits powered by induced line current.

2.4 TRANSMITTERS

- A. Temperature Transmitter:
 - 1. Two or three wire transmitter, with adjustable setpoint, and selectable range. Select range with mid-range at setpoint.
 - 2. Accuracy, 0.1F or 0.2 percent of span.
 - 3. Optional LED display.

2.5 CONTROL RELAYS

- A. General: Provide relays rated for current and voltage requirements of controlled equipment.
- B. Panel Mounted Relays:
 - 1. Plug in type, with DIN rail mountable plug in sockets. IDEC RH series or equal.
 - 2. UL listed.
- C. Field Mounted Relays:
 - 1. Solid state packaged relay including relay, LED indicator, provisions for mounting, transient protection and housing. Functional Devices RIB T series or equal.
 - 2. Provide with a Hand-Off-Auto switch.
 - 3. Provide internal separation between class 1 and class 2 wiring including separate wire ways or nipples.
 - 4. UL listed.

2.6 WIRING AND RACEWAYS

- A. Provide wiring and raceway complying with the National Electrical Code, Division 26, and State and Local Codes and Ordinances.
- B. Provide wiring and raceway complying with the National Electrical Code, and State and Local Codes and Ordinances.
- C. Raceways:
 - 1. EMT, metal duct, or IMC in the generator module. No exposed wiring is allowed.
 - 2. Provide rigid steel conduit raceways when raceway is buried or embedded in concrete.
 - 3. Provide 18 inches minimum to 36 inches maximum flexible metal conduit of galvanized steel construction for final connection to control devices. For connections to pipe mounted devices, and to devices in damp, wet, or exterior locations, or in mechanical rooms containing boilers or steam converters, provide oil-resistant liquid-tight flexible metal conduit.
 - 4. Provide EMT connectors with rain tight compression fittings and insulated throats.
 - 5. Wire mould is not allowed.
- D. Wiring:
 - 1. Provide wire with copper stranded conductors. Provide color or number coded jackets.
 - 2. Low voltage wiring from control components to input/output modules: 20 gauge minimum foil-shielded cable rated 100 VDC at 80 deg C.
 - 3. Provide plenum rated cable whenever wire is run without conduit.
 - 4. Provide communications network wiring meeting the gauge, impedance, capacitance, resistance and shielding requirements specified by the manufacturer of the connected devices.
 - 5. Identify wires and cables with permanent self-laminating machine print labeling system. Provide labels capable of receiving 8 characters of type written text, with minimum print on area of 1 inch by 1/2 inch, and protected by a clear sheath. Thomas & Betts E-Z Code or equal.
 - 6. Support or bundle wire with self locking, UL listed cable ties. Provide 40 lb rated cable ties incorporating a stainless steel locking insert. Provide UL 94V-0 flammability rated, halar cable ties when installed without panel enclosure. Thomas & Betts Ty-Rap or equal.
 - 7. Provide cable tie anchors designed for mechanical anchoring, allowing removal of cable tie without removal of anchor, capable of accepting at a minimum a number 8 screw.

Adhesive cable tie anchors are allowed only on the interior surface of panel doors. Panduit TM series or equal.

2.7 PANELS

- A. General: Investigate potential reuse of existing panel enclosures, Otherwise locate new panels in same locations these panel were located.
 - 1. UL listed, not over 24 inches wide by 42 inches high, constructed of 14 U.S.S gauge steel except that enclosures less than 20 inches in both dimensions may be 16 gauge. Provide multi-section or multiple individual panels as required. Hoffman or equal.
 - 2. Equipped with subpanels.
 - 3. Punched or stamped when needed to receive front mounted switches, gauges, indicating lights and alarms.
 - 4. Secure to the front of every control panel that has more than one source of power the following warning label: The word "WARNING" shall be in 1 inch high letters. Other letters shall be 1/4 inch high.
 - a. WARNING Complete de-energization of this control panel requires that circuit breakers supplying all equipment controlled by this panel be opened.
 - 5. Provide track mounted terminals with integral permanent labeling system. Integral screws for securing connected wires. Voltage and amperage ratings to match terminated wire ratings. Marathon or equal.
 - 6. Provide nylon insulated crimp connectors with voltage and amperage rating matching connected wire ratings unless terminal strip is designed to connect to connected wire type without using a crimp connector. Thomas & Betts STA-KON connectors or equal.
 - 7. Indicating lamps on panel shall be long life type, rated for a minimum life of 10,000 hours.
- B. Interior Enclosures:
 - 1. Piano hinged front with latch and lock.
 - 2. Baked enamel finish.
 - 3. Concealed enclosures may be standard electrical boxes.

2.8 FIRESTOPPING

A. Capable of maintaining an effective barrier against flame, heat, and smoke. Metalines, Dow, 3M, or equal.

- B. Provide installations classified in Underwriter's Laboratories (UL) Building Materials Directory or listed in the Warnock Hersey International Directory.
- C. Paintable where exposed to view.
- D. Waterproof in plumbing chases.
- E. Provide the product of more than one manufacturer if required to provide listed installations throughout.

PART 3 - EXECUTION

3.1 GENERAL

- A. Modify and add existing control system devices as indicated. Connect new sensors to the existing Johnson Controls automation system so inputs can be monitored and alarmed on the existing operator workstation. Extend and modify the existing wiring and control system power source to accommodate indicated direct digital control system devices.
- B. Before beginning installation of new system components, test the existing system devices that are being reused in modified control systems for proper operation and report any devices in need of replacement or repair to the Project Manager. At the option of the Project Manager, he will issue a contract amendment to replace or repair the defective devices or he will have Owner maintenance personnel replace or repair the defective devices. The Contractor shall be responsible for providing new devices to replace existing devices that are not brought to the Project Manager's attention before beginning installation of new system components.
- C. Work must comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards. Perform work by persons qualified to produce workmanship of specified quality. If required by the State of Alaska workers shall be licensed. If requested provide copy of license.
- D. Do not install control devices in locations where they are subject to damage or malfunction due to normally encountered ambient temperatures.
- E. Schematics and diagrams, when indicated on the Drawings, show approximate functional relationships and sequences only. All required devices are not shown. Contractor is responsible for providing all components required for a complete functioning system selected to meet the specific functional requirements of each application.
- F. Hard wire control devices. Do not use power line carriers.
- G. Ensure that the direct digital controller network, and power wiring will support both a 15 percent increase in network length, and a 10 percent increase in controllers similar to those installed without having to add additional network repeaters, increase power wire size or circuit breaker capacity.

- H. Unless indicated otherwise, connect the primary sensing input and the associated output for each control loop to the same controller. A secondary or resetting input may be attached to any controller and communicated over the network.
- I. After the final inspection and subsequent punch list inspections provide wiring schematic and Control Drawings with written sequence of operations, 11 inches by 17 inches in size, produced from the as-built Control Drawings. Provide one copy in each Operation and Maintenance Manual, and one copy, at its applicable control panel. Provide a complete facility-wide system backup on USB drive to restart and reload all programmable devices used in the control system.
- J. Label control devices mounted in the field and within control cabinets with 1/4 inch high white embossed letters and black tape background. Dymo or equal. Tags to match tags used on Control Drawings.

3.2 DEMOLITION

- A. Remove existing operators, sensors, and controllers that are replaced by new devices or that are not reused. Present all removed equipment to owner for first right of refusal before disposing of equipment. Review copy of existing system "As-Built" control schematics for existing device location and extent of required demolition.
- B. Patch holes in existing ductwork at removed sensors that are not reused with sheet metal patches of equal gauge or heavier material sheet metal that are seal airtight with adhesive and then screwed or pop riveted to the ductwork.
- C. Existing conduit and wiring may be reused when available and when wiring is rated for application. Remove existing unused conductors.
- D. Repairs: Any portion of the facility damaged, cut back or made inoperable shall be repaired with similar materials as the existing structure and/or damaged item as instructed by the Project Manager.

3.3 WIRING AND RACEWAYS

- A. Permanently label electrical or electronic wiring at each end indicating location and the device at opposite end. At the direct digital controller end use either the I/O address, if it describes the connected device, or the unique control device tag used on the control schematics. At the device end indicate both the terminal number and the controller connected at the other end. For color coded multi-conductor cable, label cable sheath not individual conductors.
- B. At field devices where conductors are not wired to terminal strips wire using a unique color for each conductor connected to that device.
- C. Install wiring in a neat and orderly manner generally running along building lines.
- D. Support low voltage wiring run without conduit at a maximum of 4 feet between anchors.

- E. Seal conduit penetrations at floor and wall penetrations with firestopping installed as indicated. Note that this applies to all floor and wall penetrations, not just fire barrier penetrations. At all mechanical rooms or other rooms containing floor drains, except those with slab on grade floors, make penetration watertight and extend sleeve 3 inches above the floor.
- F. Wire all electrical controls and switches furnished under this Section of the Specifications.
- G. Make wire connections using factory fabricated jack assemblies, terminal strips, or solder connections. Use crimp connectors on stranded wire unless connecting to terminal strips approved for direct stranded wire connection. Insulate solder connections with heat shrink tubing. Field connections in control power wiring circuits may be made using wire nuts.
- H. Avoid splices in signal wire, where unavoidable connect with solder connections and label on each side of splice. Use identical wire type and color on each side of splice.
- I. Conceal wiring in finished areas. Unless otherwise noted, install wiring inside conduit or fully enclosed metallic raceway.
- J. Low voltage wiring installed in concealed accessible locations may be run without conduit. Sleeve wiring at wall penetrations.
- K. Metal raceways crossing expansion joints make provision for 3 way movement. For conduits 1 & 1/2 inch and larger use O-Z type DX fittings, or equal.
- L. At raceway penetrations of the vapor barrier provide a double splice patch (one on each side of vapor barrier) by cutting a square piece of vapor barrier 12 inches larger on all sides than the pipe. Cut a round hole in the center of the square splice patch, smaller than the pipe, to form a stretched fit. Force the pipe through the splice patch and tape all sides to the vapor barrier and seal the vapor barrier to the pipe at the penetration with an adhesive compatible with the vapor barrier material.
- M. Securely seal at both ends, raceways running from a warm area to a cold area. Ductseal or equal.
- N. Install all wiring in accordance with National Electrical Code, and State and Local Codes and Ordinances.

3.4 PANELS

A. Provide UL listed panel assemblies when required by local authorities.

3.5 SENSORS AND SWITCHES

A. Mount room sensors 48 inches above finished floor, with any operable portion no higher than 48 inches, unless otherwise indicated. Where adjacent to light switches mount at same height as switches to provide a clean horizontally aligned installation unless doing so requires the operable portion to be above 48 inches. For sensors with tamper proof guards, sensors may be mounted between 48 inches and 60 inches above finished floors.

- B. Fill immersion fluid temperature sensor wells with heat conducting compound. At 1-1/2 inches and smaller piping install wells in pipe tees one size larger than line size.
- C. Provide sensors and thermostats installed on exterior surfaces with insulated bases such that actual room temperature not wall surface temperature is sensed.

3.6 CONTROL POWER SUPPLY

- A. Provide electric power to control devices from control system power circuit or from device or equipment being controlled.
- B. Carry a dedicated ground wire to controllers from the associated breaker panel. Do not use the conduit system for grounding purposes.

3.7 TESTING AND ADJUSTING

- A. Upon completion of the installation, the contractor shall initiate operation of the control system and perform all necessary testing and diagnostics to ensure proper operation. A formal commissioning procedure shall be utilized to insure complete system integrity and conformance to these specifications. This procedure shall consist of two separate steps incorporating point verification and program verification. Commissioning forms shall address all field devices, field controllers, software statements, and software points.
- B. Verify correct installation and wiring of all points.
- C. Confirm that all devices are installed correctly. Verify that terminations are tight and of correct polarity. Document and signoff the results on Point Verification form.
- D. Verify that all points are wired to the correct termination block at the control panel by verifying continuity between the device and the panel termination. Document and signoff results on Point Verification form. Verify that each sequence performs as specified in contract documents. Tune each loop as required for proper operation.
- E. Document and signoff the results on Program Verification form.
- F. Activate all digital input sensors and confirm proper point status at the panel. Measure conditions at all analog input sensors with an independent reference device, calibrate as required, and confirm proper point status at the panel. Document and signoff the results on Point Verification form.
- G. Deficiencies revealed by failed test(s) shall be repaired and corrected and the test(s) repeated until successful.
- H. Provide Substantial inspection data to consist of the following as a minimum:
 - 1. Provide signed off Point Verification commissioning forms to mechanical engineer and owner prior to owner acceptance walkthrough.

- 2. Provide signed off Point Verification forms indicated the correct execution of all sequence of operations for each piece of equipment. List test procedure and results.
- 3. Point logs indicated point values with time and date stamp.

3.8 DATABASE ARCHIVAL AND UPGRADE

A. Provide a complete database backup USB drive for the building management system and each direct digital controller to the Owner at final inspection. If software modifications are required during the warranty period update USB drive.

3.9 SEQUENCE OF OPERATION

- 1. Digital Control and Monitoring
 - a. Generator Operating Temperature
 - b. Generator Enclosure Temperature
 - c. Day Tank Fuel Level
 - d. Generator On/Off Status
- 2. Alarms
 - a. Generator Over Temperature
 - b. Low Space Temperature
 - c. High Space Temperature
 - d. Day Tank Low Fuel Level
 - e. Generator Running
- 3. Transmit alarms to the operator workstation and to the same remote alarm notifications that are presently in the system.

3.10 SUBSTANTIAL INSPECTION REQUIREMENTS

- A. Substantial inspection data must be submitted for review, reviewed by the Project Manager, corrected in accordance with review comments, and accepted by the Project Manager before a request for final or substantial completion inspection will be considered by the Project Manager.
- B. Prior to the substantial inspection, review and test entire installation for conformance with contract documents. Test shall include thorough field check of sequence of operations for each system and piece of equipment including simulation of all possible modes of operation. With the call for inspection, verify in writing that this system review and test has been performed and anything not conforming to contract documents shall be so noted.
- C. During the Substantial inspection Contractor personnel shall provide on-site assistance to inspection personnel required for a complete and thorough inspection.
- D. During the Substantial inspection Contractor personnel shall demonstrate that the control system performs in accordance with the contract documents. Provide material and personnel required to perform the demonstration.

END OF SECTION

SECTION 23 11 13 - FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Fuel Oil Piping Above Ground.
- B. Unions and Flanges.
- C. Pipe Hangers and Supports.

1.2 RELATED WORK

- A. Section 23 05 00 Common Work Results for HVAC.
- B. National Fire Protection Association:
 - 1. NFPA 30 Flammable and Combustible Liquids Code.
 - 2. NFPA 31 Standard for the Installation of Oil-Burning Equipment.
- C. Underwriters Laboratories Inc.:
 - 1. UL 567 Pipe Connectors for Flammable Liquids and Combustible Liquids and LP-Gas.

1.3 SUBMITTALS

- A. Submittal Procedures under provisions of the Division 01.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
 - 3. Fuel Piping Specialties: Submit manufacturer's catalog information including capacity, rough-in requirements, and service sizes.
- C. Test Reports: Submit written test results for piping system pressure test.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves, piping system, and system components.
- B. Project Record Documents: Record actual locations of piping mains with invert elevations, valves, manholes, and leak detection and location system.
- C. Operation and Maintenance Data under provisions the Division 01. Submit spare parts lists, exploded assembly views, for tank and inventory leak detection.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 31.
- B. Perform Work in accordance with authority having jurisdiction.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum three years documented experience or approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle under the provisions of the Division 01.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 COORDINATION

A. Under the provisions of the Division 01.

1.10 WARRANTY

A. Under the provisions of the Division 01.

PART 2 - PRODUCTS

2.1 FUEL OIL PIPING - ABOVE GROUND

- A. Steel Pipe: ASTM A53/A53M or ASME B36.10M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M wrought carbon steel and alloy steel welding type.
 - 2. Joints Exterior: Welded or Viega MegaPress.
 - 3. Joints in Mechanical Room: Threaded for pipe 2 inch and smaller or Viega MegaPress.

2.2 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 HANGERS AND SUPPORTS

- A. Conform to NFPA 31.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

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.
- 3.2 INSTALLATION PIPE HANGERS AND SUPPORTS
 - A. Install hangers and supports in accordance with ASTM F708 and MSS SP 89.
 - B. Support horizontal piping hangers as scheduled.

- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- F. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

3.3 INSTALLATION - ABOVEGROUND PIPING

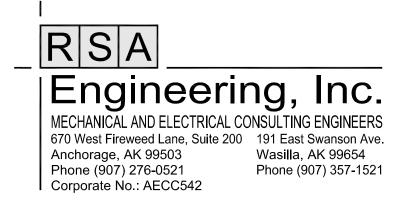
- A. All piping no longer used shall be demolished.
- B. Install fuel oil piping in accordance with NFPA 31.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install fire stopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Division 07.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer. Refer to Division 09.
- I. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Division 09.
- J. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

END OF SECTION

CONSTRUCTION DOCUMENTS **DHSS FAIRBANKS PIONEER HOME GENERATOR UPGRADE** FAIRBANKS, ALASKA JULY 19, 2017

PROJECT #AJF 18-07C

PREPARED BY:





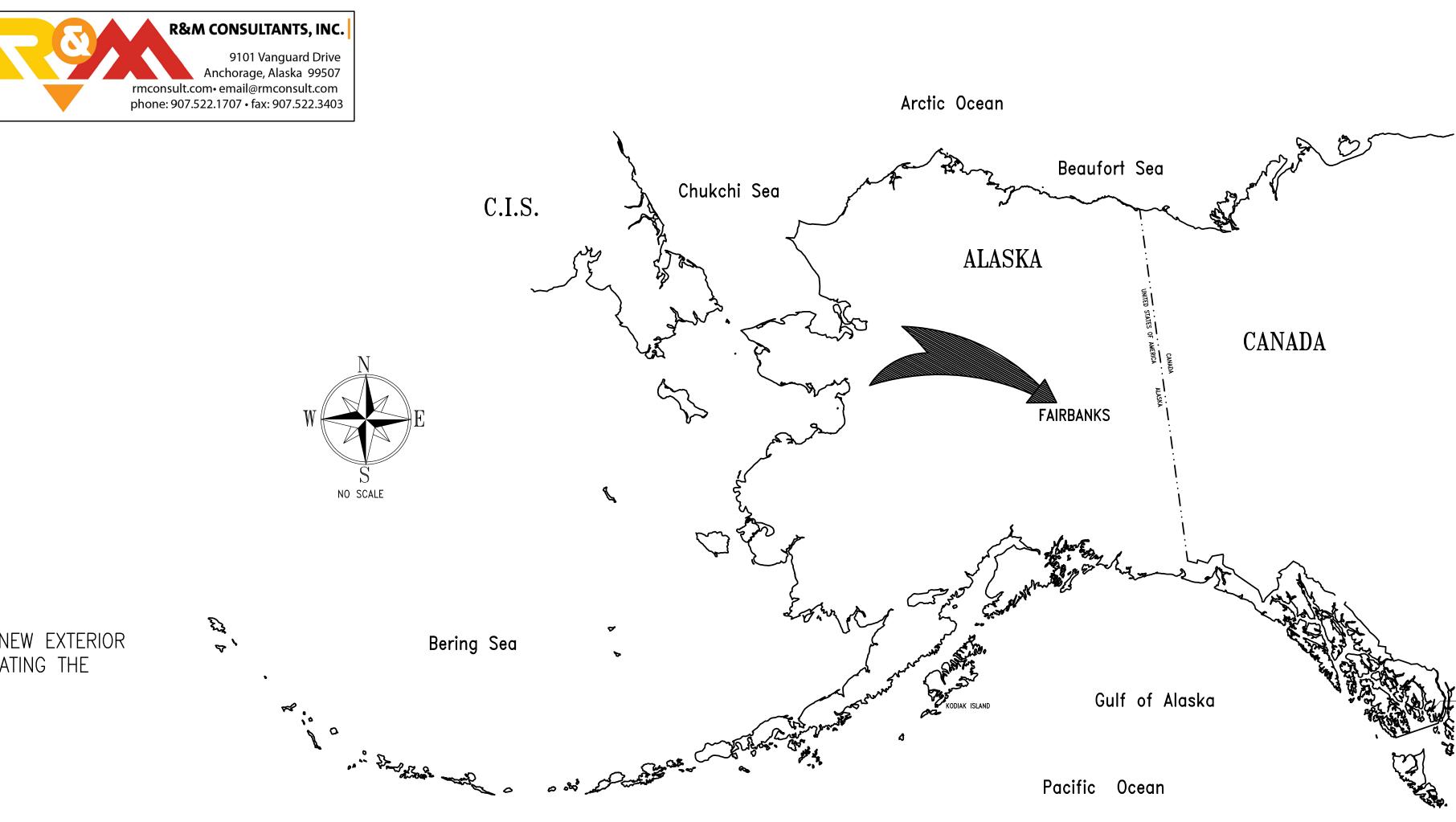
DO DENALI STREET SUITE 710 ANCHORAGE, ALASKA 99503 {907} 561-5780 212 FRONT STREET FAIRBANKS, ALASKA 99701 {907} 456-5780 WWW. BETTISWORTHNORTH.COM

INDEX TO DRAWINGS:

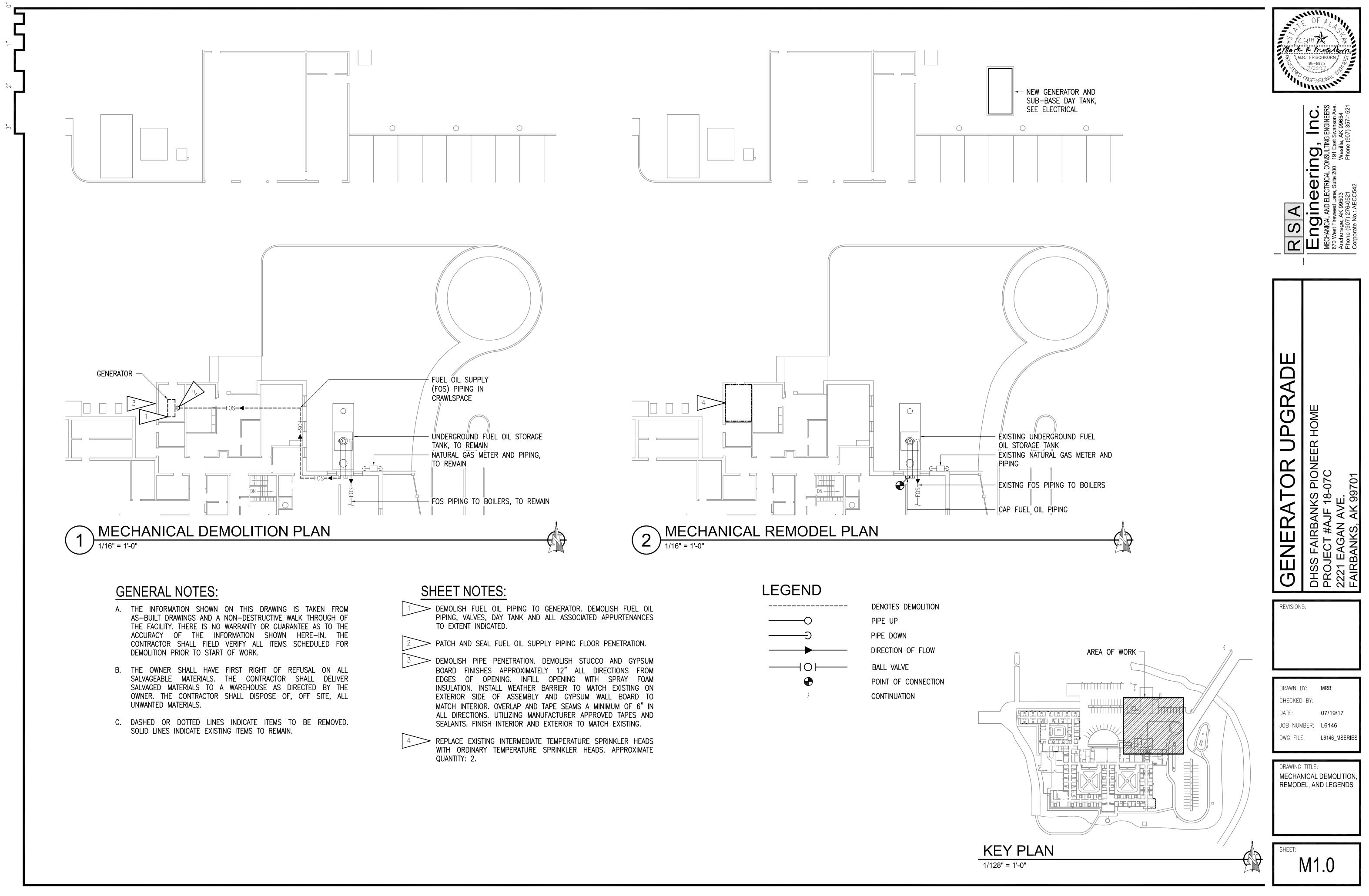
- M1.0 MECHANICAL DEMOLITION, REMODEL, AND LEGENDS
- E0.1 ELECTRICAL LEGEND, LOAD CALCULATIONS, AND PANEL SCHEDULE
- E0.2 ELECTRICAL ONE-LINE DIAGRAMS
- E1.1 ELECTRICAL DEMOLITION PLAN
- E2.1 ELECTRICAL REMODEL PLAN
- E2.2 ENLARGED ELECTRICAL PLANS
- E3.1 ELECTRICAL DETAILS

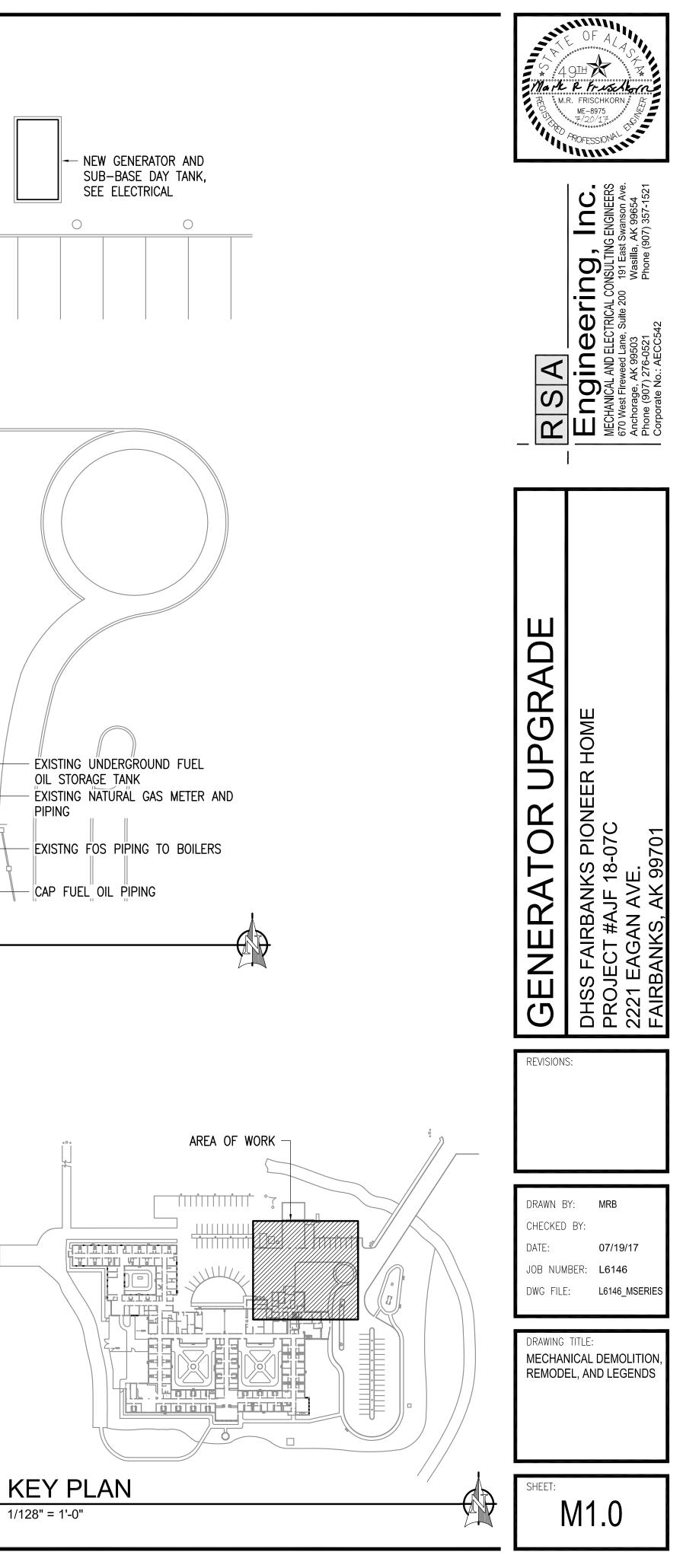
SUMMARY OF WORK:

THIS PROJECT INCLUDES REPLACING THE EXISTING INTERIOR GENERATOR WITH A NEW EXTERIOR GENERATOR WHICH CAN SUPPORT THE ENTIRE BUILDING DEMAND LOAD, AND UPDATING THE EXISTING DISTRIBUTION SYSTEM TO ACCOMMODATE THE NEW GENERATOR.



Pacific Ocean

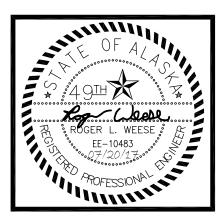




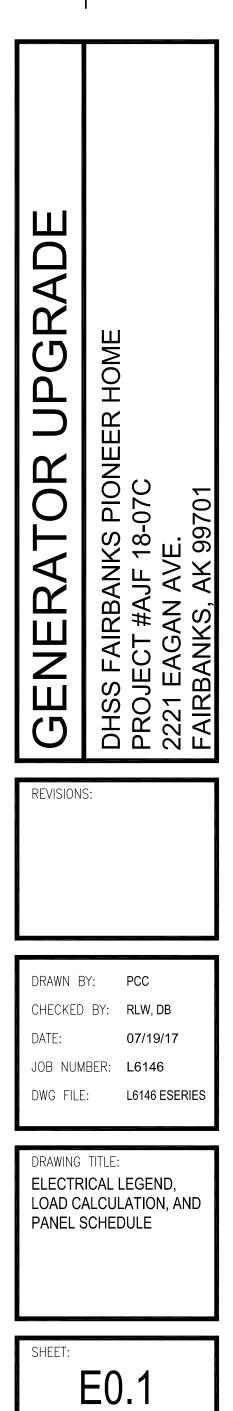
MFR/MODEL: SQUARE 'D' TYPE NQ					VOLTS: 120/208V,3PH,4W ENCLO				SURE:	NEMA 1		100	Α				
					VOLT-AMPS					MTG: SURFACE							
	CIRC	POLE	AMPS	SERVICE	TYPE	ļ	Ą	E	3	(C	TYPE	SERVICE	AMPS	POLE	CIRC	
	1	1	20	LIGHTS	LTG	218	2,500					HEAT	HEATER	30	2	2	T
	3	1	20	SPARE					2,500			HEAT	^^	30	2	4	
	5	1	15	BLOCK HEATER	HEAT					1,000	1,000	HEAT	BATTERY BLANKET	15	1	6	T
	7	1	15	ENGINE HEATERS	HEAT	760							SPARE	20	1	8	
	9	1	20	SPARE					1,200			MISC	BATTERY CHARGER	15	1	10	
	11	1	20	FUEL PUMP	MOTR					1,176	720	RECP	MODULE RECP	20	1	12	
	13	1	-	SPACE									SPACE	-	1	14	_
	15	1	-	SPACE									SPACE	-	1	16	
	17	1	_	SPACE									SPACE	-	1	18	-
	19	1	-	SPACE									SPACE	-	1	20	
TOTAL V-A						3,478		3,700		3,896		11,0	074 VA				
TOTAL AMPS							29		31		32			31 A			
			ŀ	VAILABLE FAULT CURRENT :	2,951			RATING:	10,000								
					LTG	RECP	MOTR		MISC	KIT	HEAT	SPEC	TOTAL		AMP		
CONNECTED LOAD IN KVA (THIS PANEL): 0.22					0.72	1.18	0.29	1.20	0.00	7.76	0.00	11.1 KVA			Α		
CONNECTED LOAD IN KVA (BRANCH PANELS):												0.0 KVA			Α		
TOTAL CONNECTED LOAD IN KVA: 0.22				0.72	1.18	0.29	1.20	0.00	7.76	0.00	11.1 KVA			A			
DEMAND LOAD IN KVA: 0.27 PANEL NOTES:					0.72	1.18	0.29	1.20	0.00	9.70	0.00	13.4 KVA		37	A		
F	ANEL	. NO	IES:										<u>. OPTIONS:</u> LUGS ONLY				

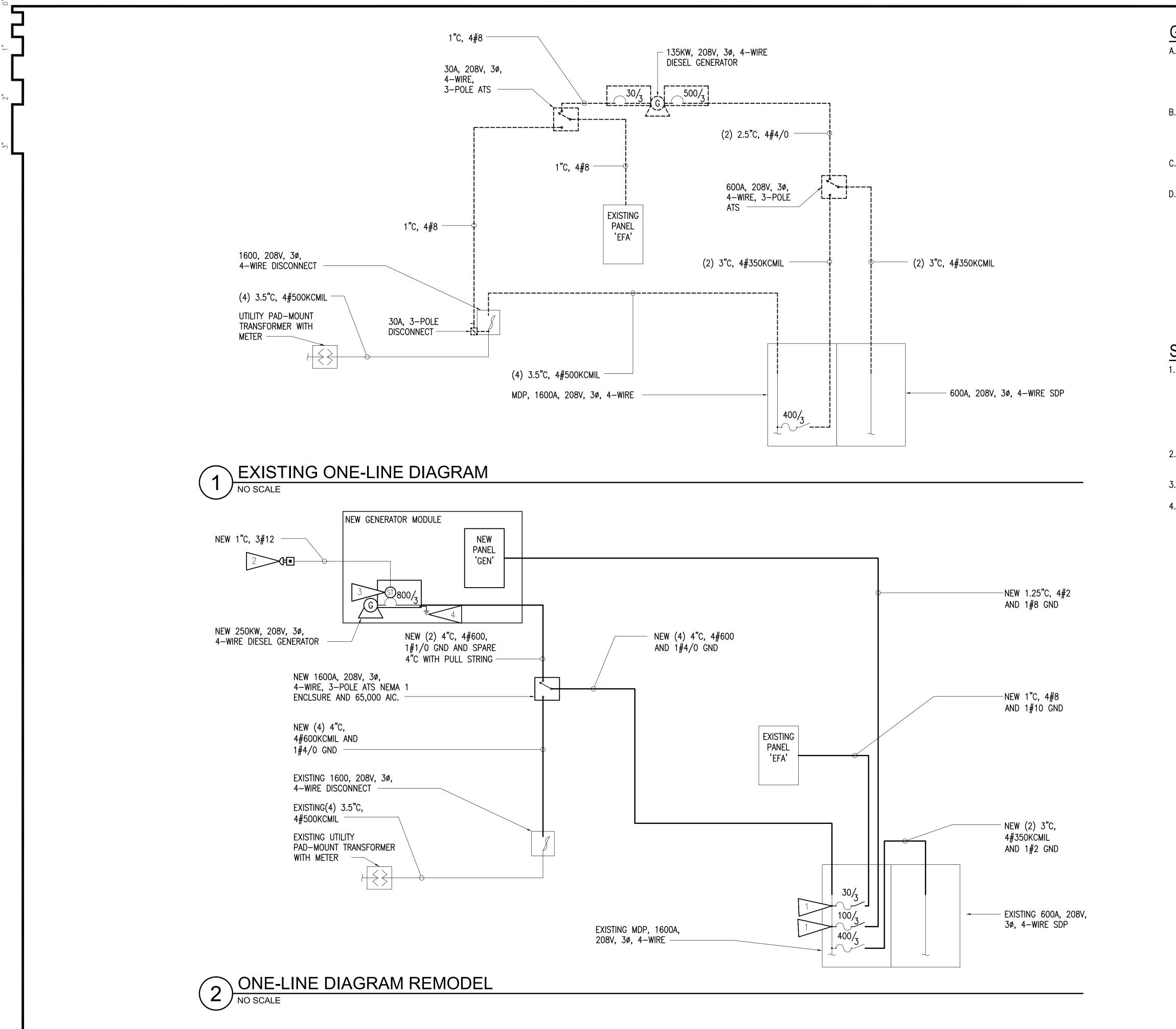
ELECTRICAL SERVICE LOAD CALCULATION							
PROJECT:	DHHS FAIRBANKS PIONEER HOME GENERATOR UPGRADE ANCHORAGE, ALASKA						
DATE :							
· · · ·	EXISTING 1,600A, 208V, 3-PHASE, 4-WIRE SERVICE WITH (4) 4#600KCMIL FEEDERS VIA AN EXISTING 1,600A, ATS TO 1,600A, MDP.						
GVEA (4/24/ ASSUME PF	,	177 KW 208 KVA 260 KVA					
	OAD REMOVEDNO.VATE RADIATOR1(1,729)	<u>(1,729)</u> VA					
TOTAL		(1,729) VA = (5) A					
	ND LOAD ADDED FROM PANEL 'GEN':	13,363 VA					
	OAD ON SERVICE	271,927 VA = 755 A					
EXISTING SERVICE AND DISTRIBUTION EQUIPMENT HAVE ADEQUATE CAPACITY FOR NEW LOAD ADDED.							

LEGEND					
	CONDUIT, CONCEALED				
<u> </u>	NUMBER AND SIZE OF WIRES (NO MARKS = $3 \# 12$)				
A-2	HOMERUN TO PANEL (PANEL AND CIRCUIT No.)				
	NEW PANEL				
	EXISTING PANEL				
Ф	DUPLEX RECEPTACLE				
65	DUPLEX RECEPTACLE WITH GROUND FAULT CIRCUIT INTERRUPTER				
	QUADRAPLEX RECEPTACLE				
J	JUNCTION BOX				
∎Ð	EMERGENCY PUSHBUTTON SWITCH				
\diamond	MOTOR (SIZED AS NOTED)				
\$ ⊤	FRACTIONAL HORSEPOWER MOTOR STARTER				
6	DISCONNECT SWITCH				
FCP	FIRE ALARM CONTROL PANEL				
GRA	GENERATOR REMOTE ANNUNCIATOR PANEL				
3	SMOKE DETECTOR				
0	HEAT DETECTOR				
	DUPLEX RECEPTACLE TO BE REMOVED (DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED TYPICAL)				
	NOTE TAG (No. INDICATES NOTE)				
AFF	ABOVE FINISHED FLOOR				
AFG	ABOVE FINISHED GRADE				
С	CONDUIT				
СО	CONDUIT ONLY				
E	DENOTES EXISTING ITEM				
GFCI	GROUND FAULT CIRCUIT INTERRUPTER				
GRSC	GALVANIZED RIGID STEEL CONDUIT				
МСВ	MAIN CIRCUIT BREAKER				
MLO	MAIN LUGS ONLY				
SDP	STANDBY DISTRIBUTION PANEL				
MDP	MAIN DISTRIBUTION PANEL				
NEC	NATIONAL ELECTRICAL CODE				
R	DENOTES EXISTING ITEM THAT HAS BEEN RELOCATED				
TYP	TYPICAL				
UON	UNLESS OTHERWISE NOTED				
WP	WEATHERPROOF				







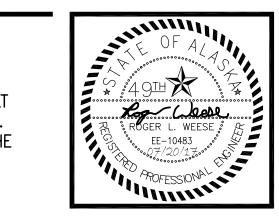


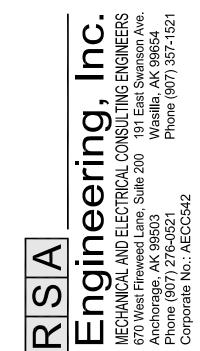
A. THE INFORMATION SHOWN ON THIS DRAWING IS TAKEN FROM AS-BUILT DRAWINGS AND A NON-DESTRUCTIVE WALK THROUGH OF THE FACILITY. THERE IS NO WARRANTY OR GUARANTEE AS TO THE ACCURACY OF THE INFORMATION SHOWN HERE-IN. THE CONTRACTOR SHALL FIELD VERIFY ALL ITEMS SCHEDULED FOR DEMOLITION PRIOR TO START OF WORK.

B. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL SALVAGEABLE MATERIALS. THE CONTRACTOR SHALL DELIVER SALVAGED MATERIALS TO A WAREHOUSE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL DISPOSE OF, OFF SITE, ALL UNWANTED MATERIALS.

C. DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED. SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.

D. EXISTING ELECTRICAL SYSTEM HAS SEPARATE TRANSFER SWITCH THAT WOULD TYPICALLY BE USED IN EMERGENCY POWER APPLICATIONS BUT THIS IS NOT CONSIDERED AN EMERGENCY SYSTEM. ALL EXISTING EMERGENCY LIGHTS HAVE BATTERY BACKUP. NEW GENERATOR AND ASSOCIATED TRANSFER SWITCH ARE DESIGNED AS A STANDBY POWER SYSTEM. NO CHANGES REQUIRED FOR EMERGENCY LIGHTING.





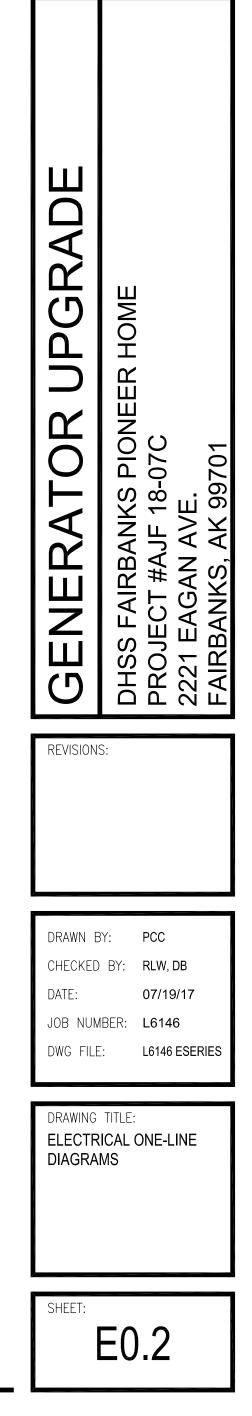
SHEET NOTES:

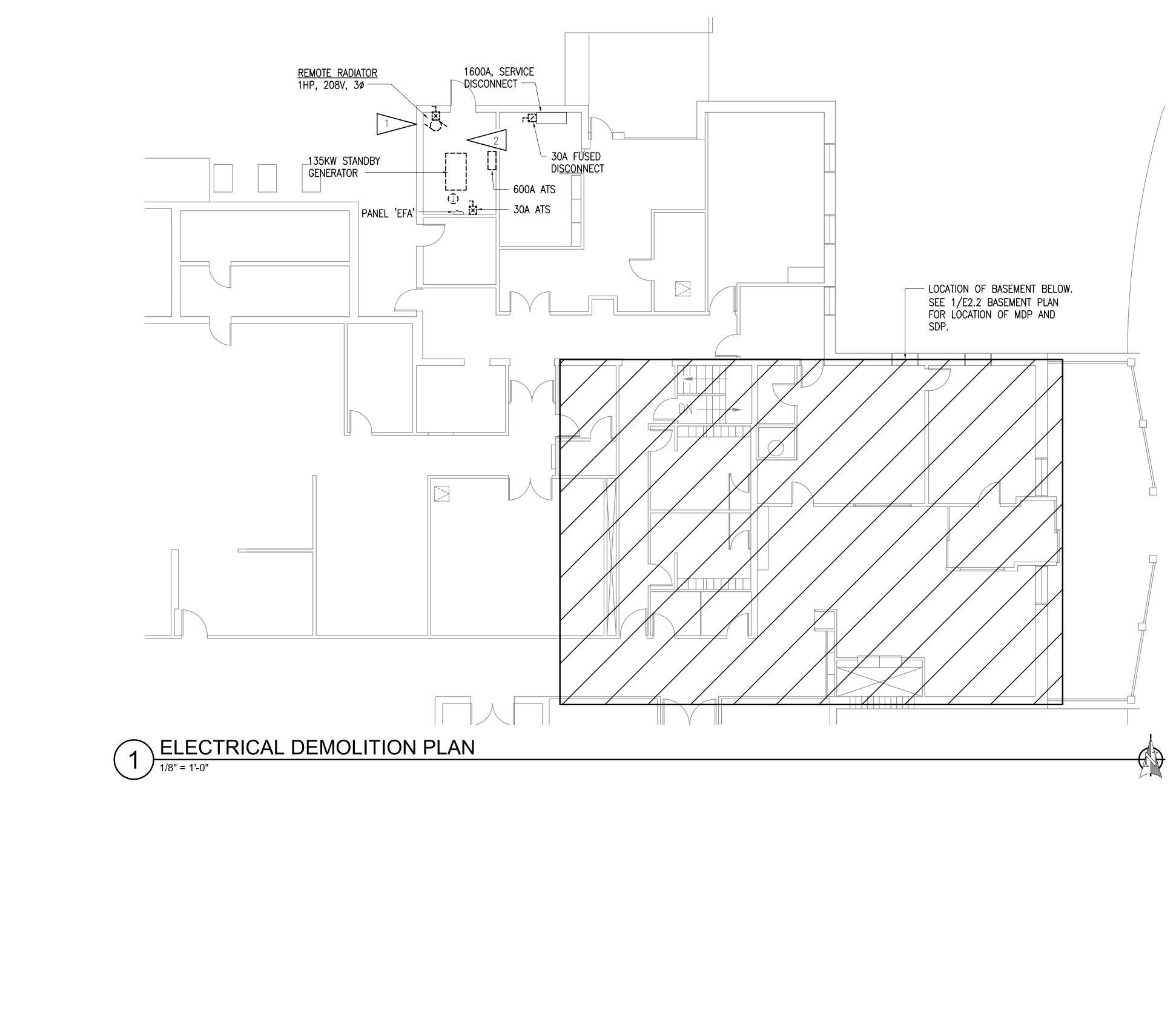
INSTALL NEW FUSED DISCONNECT IN SPACE AVAILABLE IN THE EXISTING SWITCHGEAR. THE EXISTING SWITCHGEAR IS A WESTINGHOUSE MODEL FDP SWITCHGEAR, 120/208V, 3¢, 4W, WITH A 1600A MAIN LUGS. THE NEW FUSED DISCONNECT SHALL BE COMPATIBLE WITH AND LISTED FOR USE IN THE EXISTING PANELBOARD AND SHALL HAVE A MINIMUM SHORT CIRCUIT AIC RATING TO MATCH THE LOWEST RATED EXISTING DEVICE IN THE PANEL.

2. GENERATOR SHUNT TRIP DISCONNECT, SEE DETAIL 3/E3.1 AND 1/E2.1 FOR LOCATION.

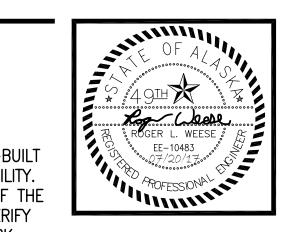
3. PROVIDE SHUNT-TRIP DEVICE FOR GENERATOR MOUNTED BREAKER.

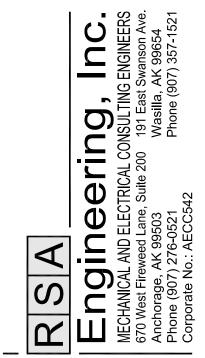
4. SEE GROUNDING DETAIL 4/E3.1.





- 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. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL SALVAGEABLE MATERIALS. THE CONTRACTOR SHALL DELIVER SALVAGED MATERIALS TO A WAREHOUSE AS DIRECTED BY THE OWNER. THE CONTRACTOR SHALL DISPOSE OF, OFF SITE, ALL UNWANTED MATERIALS.
- C. DASHED OR DOTTED LINES INDICATE ITEMS TO BE REMOVED. SOLID LINES INDICATE EXISTING ITEMS TO REMAIN.
- D. EXTERIOR WALL CONSTRUCTION AT GENERATOR ROOM IS ASSUMED TO HAVE EXTERIOR STUCCO FINISH, 6"CMU BLOCK, 4" RIGID FOAM INSULATION, AND INTERIOR 5/8" GYPSUM BOARD FINISH.

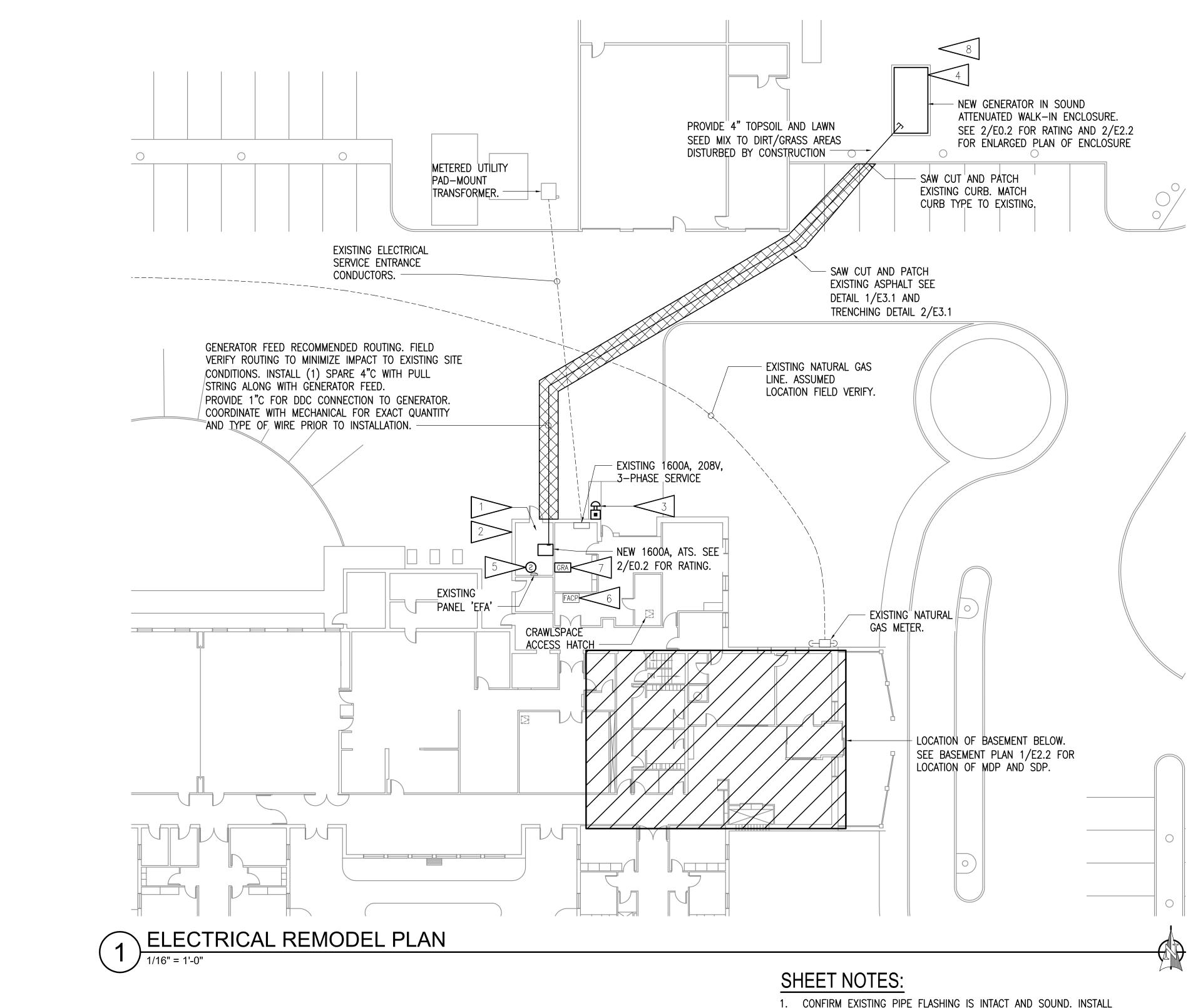




SHEET NOTES:

- 1. REMOVE (2) TWO 48"W X 30"H LOUVERS. DEMOLISH STUCCO AND GYPSUM BOARD FINISHES APPROXIMATELY 12" ALL DIRECTIONS FROM EDGES OF OPENING. SEE NOTE 2, SHEET E2.1.
- 2. DISCONNECT GENERATOR EXHAUST STACK FROM DEMOLISHED EQUIPMENT LEAVE ROOF STACK IN PLACE. SEE NOTE 1, SHEET E2.1.

GENERATOR UPGRADE	DHSS FAIRBANKS PIONEER HOME PROJECT #AJF 18-07C 2221 EAGAN AVE. FAIRBANKS, AK 99701
DATE: JOB NUM DWG FILE DRAWING	BY: RLW, DB 07/19/17 IBER: L6146 E: L6146 ESERIES
SHEET:	E1.1



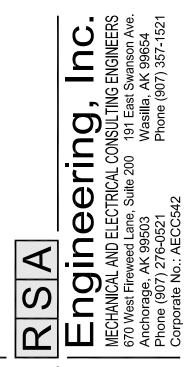
- CONFIRM EXISTING PIPE FLASHING IS INTACT AND SOUND. INSTALL MOISTURE PROOF SEAL OVER TOP OF CAP. SECURE IN PLACE. REMOVE AND REAPPLY EXTERIOR AND INTERIOR SEALANT FOR TIGHT, WATERPROOF SEAL. FILL PIPE AND STACK CAVITIES WITH EXPANDING SPRAY FOAM INSULATION. TAPE AND SEAL VAPOR RETARDER TO FINISH CEILING MATERIAL EXTENDING A MINIMUM OF 6" IN ALL DIRECTIONS OF PENETRATION.
- 2. INFILL OPENINGS WITH WOOD STUD FRAMING TO MATCH EXISTING WIDTH. INFILL CAVITIES WITH BATT INSULATION WIDTH OF FRAMING. INSTALL WEATHER BARRIER TO MATCH EXISTING ON EXTERIOR SIDE OF ASSEMBLY, VAPOR RETARDER AND GYPSUM WALL BOARD TO MATCH INTERIOR. OVER LAP AND TAPE SEAMS A MINIMUM OF 6" IN ALL DIRECTIONS, UTILIZING AIR AND VAPOR RETARDER MANUFACTURER APPROVED TAPES AND SEALANTS. FINISH INTERIOR AND EXTERIOR TO MATCH EXISTING.
- 3. GENERATOR SHUNT-TRIP DISCONNECT. SEE DETAIL 3/E3.1.

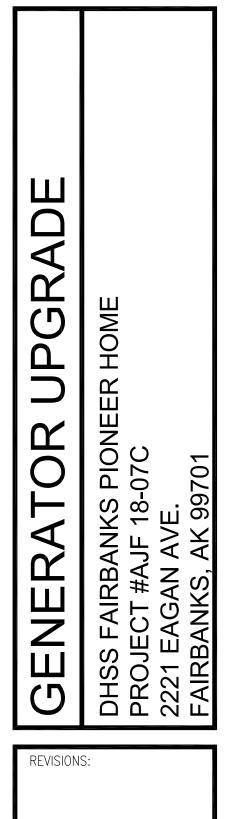
A. ALL CONDUITS RUNNING ACROSS THE PARKING LOT SHALL BE INSTALLED BELOW GRADE.

SHEET NOTES (CONTINUED):

BASIS OF DESIGN: CUMMINS DQDAA 250 KW GENERATOR WITH DUAL 4. WALL SUB-BASE FUEL TANK ENCLOSURE DIMENSIONS: APPROXIMATE ENCLOSURE @ 210" LONG, 108" WIDE, 106" HEIGHT ENCLOSURE 6711# WEIGHT: GENERATOR 4926# WET 8,520# (1,420 GALLONS) FUEL GENERATOR PAD: 18" THICK CONCRETE WITH #5 REBAR @ 8" ON CENTER EACH WAY CENTERED IN SLAB THICKNESS. CONCRETE PAD SHALL BE MINIMUM OF 8" LARGER ON EACH EDGE THAN ENCLOSURE. BASE OF SLAB SHALL BE 6" BELOW FINISH GRADE. PAD FOR DQDAA BASIS OF DESIGN: 18" THK X 18'-0" X 10'-4" GENERATOR PAD FOUNDATION: EXCAVATE 12" MINIMUM BELOW FOUNDATION AND BACKFILL WITH DOT & PF SUBBASE GRADING B OR BASE COURSE C-1. BACKFILL IN 4" MAXIMUM LIFTS AND COMPACT WITH HAND OPERATED TAMPERS TO 95% MAXIMUM DENSITY AS DETERMINED BY ATM 207 OR ATM 212. CONTRACTOR RESPONSIBILITY: RETAIN ENGINEER LICENSED IN ALASKA TO PREPARE CALCULATIONS FOR SEISMIC ANCHORAGE REQUIREMENTS. (NOTE: IF CALCULATIONS INDICATE ADDITIONAL DIMENSIONS ARE REQUIRED TO ACCOMMODATE ANCHOR BOLT EDGE DISTANCES, CONTRACTOR SHALL PROVIDE REQUIRED DIMENSIONS AT NO ADDITIONAL COST TO THE PROJECT.) Ss=0.995G, S1=0.380, Fa=1.1, Sms=1.095, Sds=0.73, Ip=1.5 SITE CLASS D CONCRETE: SLUMP = 6" MAXF'c: 4,000 PSI 0.50 MAX Wc: 5% +/- 1% AIR: REBAR: 60,000 PSI YIELD LIGHTLY TROWEL SURFACE WITH FINE BROOM FINISH. RADIUS OR CHAMFER (1") EDGES. ANCHORS PER CONTRACTOR'S ENGINEER'S CALCULATIONS. DESIGN CODE IBC 2015 SNOW: Pq = 70psfPf = 50psf MINIMUMAUTHORITY HAVING JURISDICTION: CITY OF FAIRBANKS BUILDING DEPARTMENT. SUBMIT GENERATOR ANCHORAGE AND PAD AND ENCLOSURE CALCULATIONS OR PRODUCT DATA NOTING COMPLIANCE WITH DESIGN LOADS TO AHJ FOR REVIEW AND PERMITTING. 5. INSTALL NEW DEVICE IN EXISTING LOCATION AND CONNECT TO EXISTING SYSTEM. SEE DEMOLITION PLAN 1/E1.1. 6. EXISTING FIRE ALARM CONTROL PANEL IS PYROTRONIX MXL ADDRESSABLE SYSTEM. PROVIDE PROGRAMMING AS REQUIRED FOR NEW DETECTOR. 7. REMOTE ANNUNCIATOR PROVIDED WITH GENERATOR PACKAGE. CONNECT TO GENERATOR AND ATS PER MANUFACTURER'S INSTRUCTIONS. COORDINATE WITH OWNER FOR EXACT LOCATION PRIOR TO ROUGH-IN. 8. THE CONTRACTOR SHALL REMOVE $(3) + / -14^{\circ}$ DIAMETER BIRCH TREES AS DESIGNATED BY THE OWNER'S REPRESENTATIVE. THE CONTRACTOR SHALL REMOVE THE TREE STUMPS AND BUTTRESS ROOTS TO A POINT EIGHT INCHES (8") BELOW THE ADJACENT GROUND LEVEL. ADDITIONALLY, THE CONTRACTOR SHALL REMOVE ALL SURFACE AND ADJACENT SUBSURFACE ROOTS WITHIN THE TREE DRIPLINE TO ELIMINATE "HUMPS" OR MOUNDS IN THE LAWN. ALL LAWN AREAS ARE TO BE LEFT FLAT AND MEET ORIGINAL GRADE. THE DISTURBED AREA SHALL BE BACKFILLED WITH A MINIMUM 4" DEPTH OF TOPSOIL AND SEEDED WITH LAWN SEED MIX.



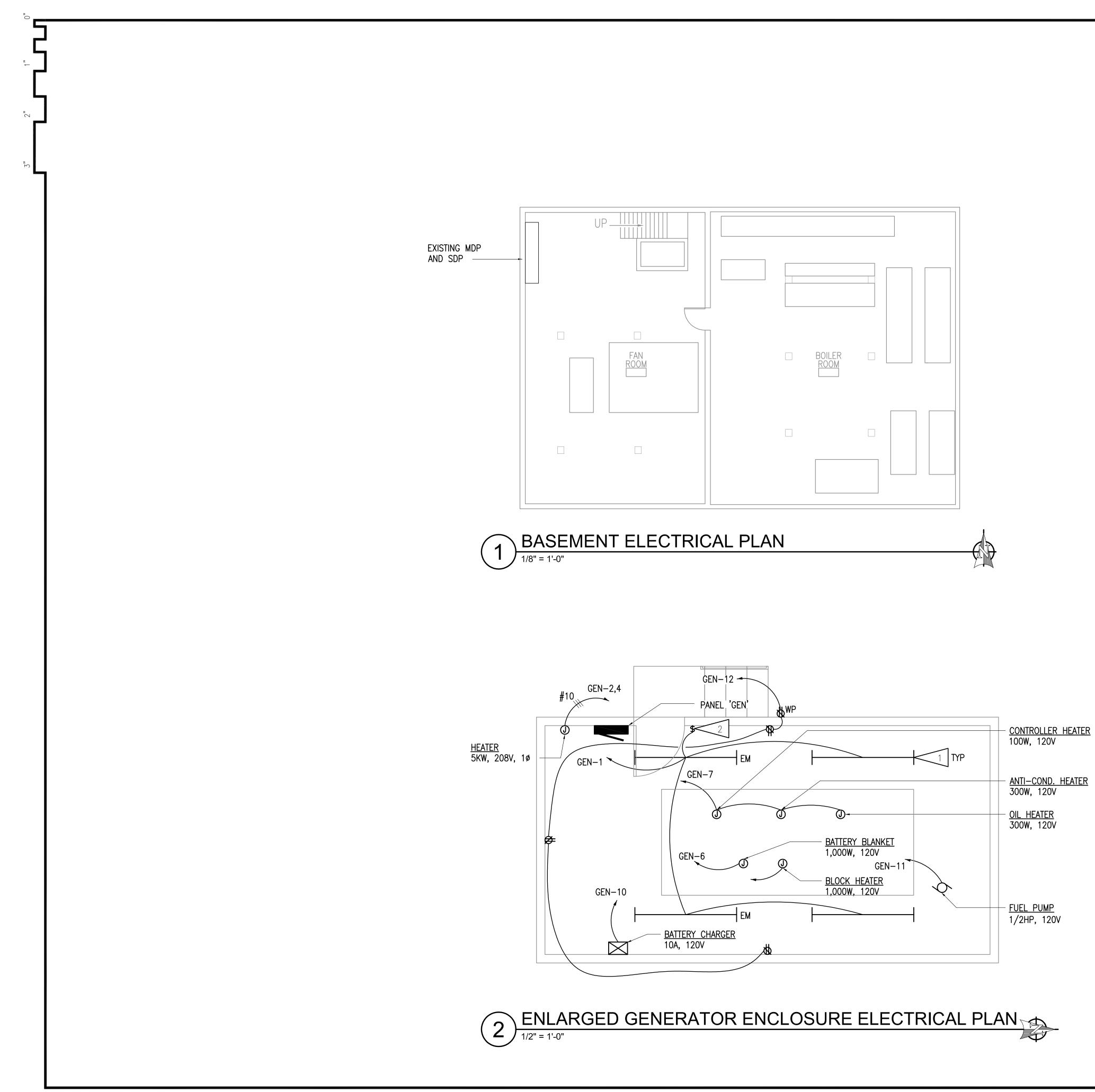




DRAWN BY:	PCC
CHECKED BY:	RLW, DB
DATE:	07/19/17
JOB NUMBER:	L6146
DWG FILE:	L6146 ESERIES

DRAWING TITLE: ELECTRICAL REMODEL PLAN

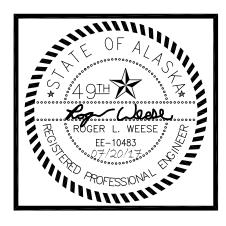
SHEET: E2.1



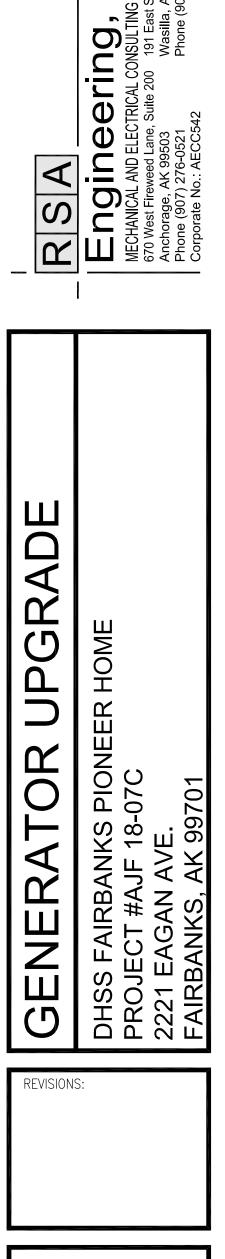
A. LAYOUT AND ELECTRICAL CONNECTIONS WITHIN GENERATOR MODULE ARE INTENDED TO SHOW GENERAL REQUIREMENTS BUT FINAL LOCATIONS SHALL BE DETERMINED BY GENERATOR/MODULE MANUFACTURER, IN CONFORMANCE WITH THE CONTRACT DOCUMENTS.

SHEET NOTES:

- 1. FIXTURE PROVIDED WITH GENERATOR ENCLOSURE. SEE SPECIFICATION SECTION 26 32 00.
- 2. MOUNT SWITCH ON STRIKE SIDE OF ACCESS DOOR.



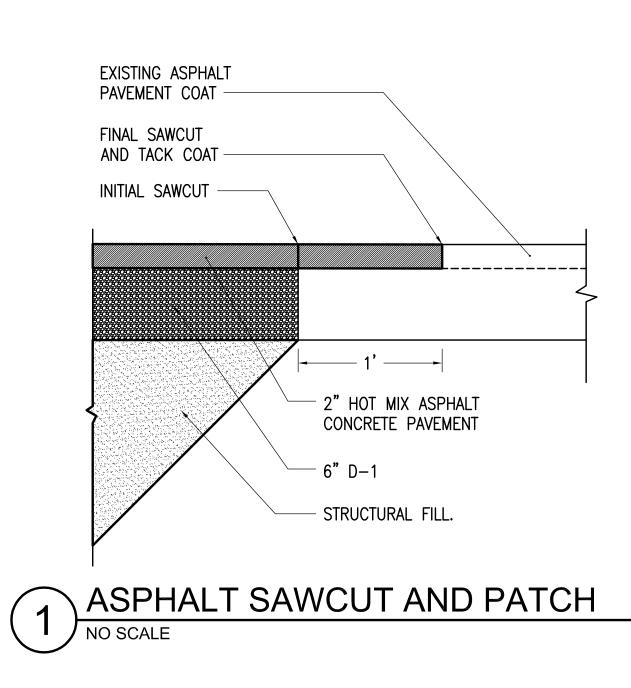
Ind. 3 ENGINEERS Swanson Ave. AK 99654

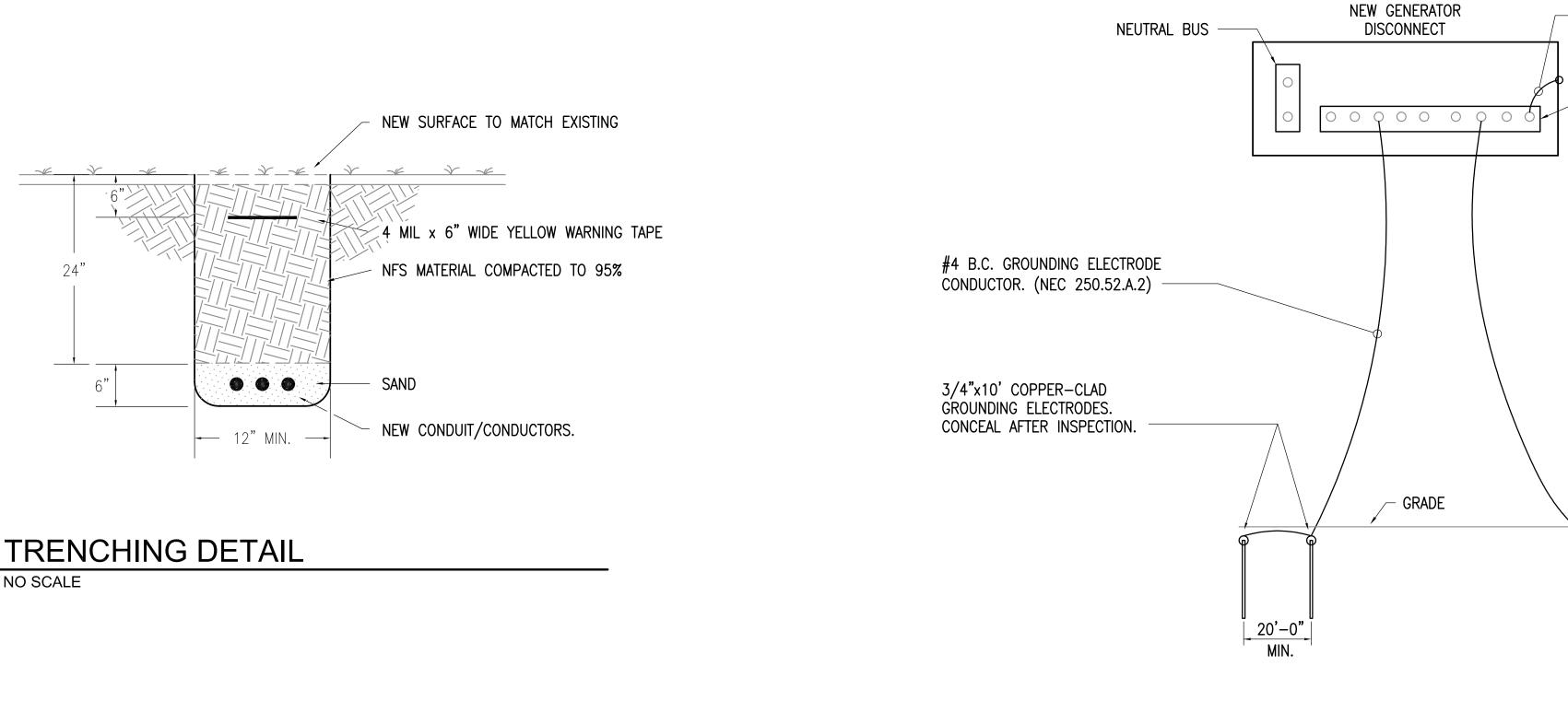


DRAWN BY:	PCC
CHECKED BY:	RLW, DB
DATE:	07/19/17
JOB NUMBER:	L6146
DWG FILE:	L6146 ESERIES

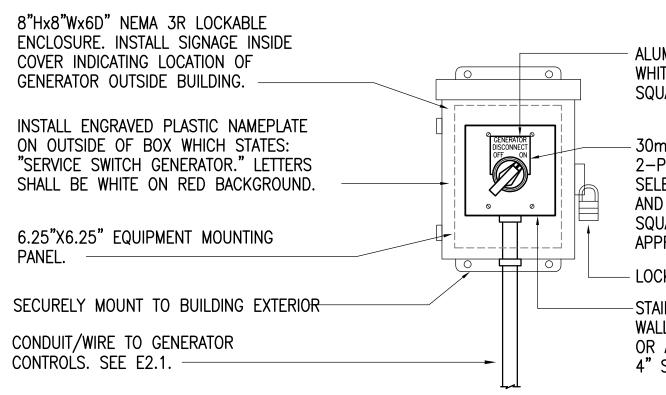
DRAWING TITLE: ENLARGED ELECTRICAL PLANS

SHEET: E2.2









GENERATOR DISCONNECT 3 NO SCALE

GENERATOR GROUNDING DETAIL 4 NO SCALE

ALUMINUM LEGEND PLATE, BLACK WITH WHITE LETTERS, TEXT AS SHOWN. SQUARE 'D' #KN300 OR EQUAL.

- 30mm HEAVY DUTY, NON-ILLUMINATED, 2-POSITION, BLACK ON/OFF SELECTOR SWITCH WITH ONE N/O AND ONE N/C CONTACT BLOCK. SQUARE 'D' CLASS 9001 TYPE 'K' OR APPROVED EQUAL.

- LOCKING HASP AND PADLOCK.

-STAINLESS STEEL, TWO UNIT FLUSH WALLPLATE. SQUARE 'D' TYPE #K26 OR APPROVED EQUAL. MOUNT ON 4" SQ. OUTLET BOX.

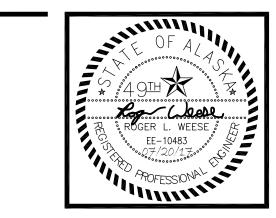
> #3/0 EQUIPMENT BONDING JUMPER (NEC 250.92)

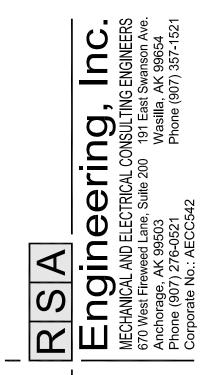
- EQUIPMENT GROUNDING BUS

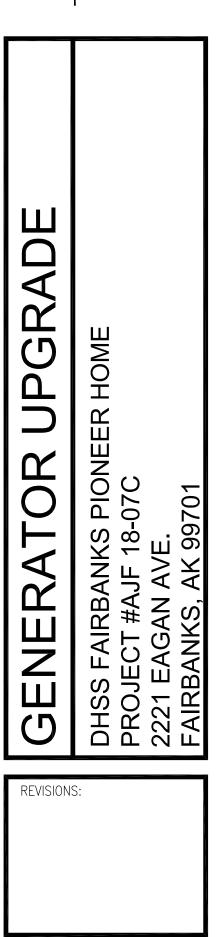
NEW GENERATOR FOUNDATION.

. ∕ .

_____ A #2 CONCRETE ENCASED ELECTRODE (NEC 250.52.A.3) CONNECT TO REBAR IN CONCRETE FOUNDATION







DRAWN BY:	PCC
CHECKED BY:	RLW, DB
DATE:	07/19/17
JOB NUMBER:	L6146
OWG FILE:	L6146 ESERIES

RAWING	TITLE:
LECTR	ICAL DETAILS

SHEET:

E3.1