

Project Manual For:

**Twin Hills Power System Upgrade
Project No. 19023**



**State of Alaska
Alaska Energy Authority
813 W Northern Lights Blvd, Anchorage, Alaska 99503**

Advertising Date: September 18, 2018

This page is blank intentionally.

DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS (yellow)

<u>Section</u>	<u>Form</u>	<u>Date</u>
<u>Invitation</u> (yellow)		
00 02 00 INVITATION TO BID	25D-7	(8/01)
<u>Bid Notices</u> (yellow)		
00 10 00 INFORMATION TO BIDDERS	25D-3	(7/88)
00 10 10 SUPPLEMENTARY INFORMATION TO BIDDERS		(12/88)
00 11 50 WORKER MEALS AND LODGING, OR PER DIEM		(5/13)
00 12 00 REQUIRED DOCUMENTS	25D-4	(4/12)
<u>Forms</u> (yellow)		
00 31 00 PROPOSAL	25D-9A	(07/03)
00 32 00 BID SCHEDULE		
00 41 00 BID BOND	25D-14	(8/01)
00 42 00 BID MODIFICATION	25D-16	(8/01)
00 43 00 SUBCONTRACTOR LIST	25D-5	(10/12)
00 51 00 CONSTRUCTION CONTRACT	25D-10A	(8/01)
00 61 00 PERFORMANCE BOND	25D-13	(8/01)
00 62 00 PAYMENT BOND	25D-12	(8/01)
00 67 00 CONTRACTOR'S QUESTIONNAIRE	25D-8	(8/01)
<u>Contract Provisions and Specifications</u> (white)		
00 70 00 GENERAL CONDITIONS		
00 80 00 SUPPLEMENTARY CONDITIONS		
00 83 00 STATE LABORERS' AND MECHANICS' MINIMUM RATES OF PAY		
		State wage rates can be obtained at http://www.labor.state.ak.us/lss/pamp600.htm . Use the State wage rates that are in effect 10 days before Bid Opening. The AUTHORITY will include a paper copy of the State wage rates in the signed Contract.
00 83 50 FEDERAL WAGE RATES		
		Federal wage rates can be obtained at http://www.wdol.gov/dba.aspx#0 for the State of Alaska. Use the federal wage rates that are in effect 10 days before bid opening. The AUTHORITY will include a paper copy of the State wage rates in the signed Contract.
00 90 00 FEDERAL TERMS AND CONDITIONS		

DIVISION 01 – GENERAL REQUIREMENTS

01 02 00	INTENT OF DOCUMENTS
01 02 70	APPLICATIONS FOR PAYMENT
01 02 80	CHANGE ORDER PROCEDURES
01 10 00	SUMMARY OF WORK
01 11 00	REGULATORY REQUIREMENTS
01 12 60	CONTRACTOR’S CERTIFICATION OF SUBCONTRACT
01 30 00	SUBMITTALS
01 31 00	PROGRESS SCHEDULES
01 32 00	PROJECT MEETINGS
01 37 00	SCHEDULE OF VALUES
01 40 00	QUALITY CONTROL
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 60 00	MATERIALS AND PRODUCTS
01 63 00	PRODUCT OPTIONS AND SUBSTITUTIONS
01 70 00	PROJECT CLOSEOUT
01 71 00	CLEANING
01 72 00	PROJECT RECORD DOCUMENTS
01 77 00	CONTRACT CLOSEOUT
01 80 00	INCIDENTAL WORK

DIVISION 03 – CONCRETE

03 30 00	CONCRETE
----------	----------

DIVISION 05 – METALS

05 12 00	STRUCTURAL STEEL
----------	------------------

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

06 10 00	ROUGH CARPENTRY
06 13 00	TIMBER CONSTRUCTION
06 17 50	METAL PLATE CONNECTED WOOD TRUSSES

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 12 00	BUILDING INSULATION
07 41 13	METAL ROOF PANELS
07 42 13	METAL WALL PANELS
07 42 14	INSULATED METAL WALL PANELS
07 43 13	VENTILATED SOFFIT PANELS

DIVISION 09 – FINISHES

09 90 00	PAINTING
----------	----------

DIVISION 13 - SPECIAL CONSTRUCTION

13 34 19 PORTABLE AND MOBILE BUILDINGS

DIVISION 23 – MECHANICAL

23 05 00 COMMON WORK RESULTS FOR MECHANICAL
23 05 29 HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT
23 07 19 PIPING INSULATION
23 09 00 INSTRUMENTATION AND CONTROL DEVICES
23 11 13 FUEL AND LUBE OIL PIPING
23 12 13 FUEL AND LUBE OIL EQUIPMENT AND SPECIALTIES
23 21 13 HYDRONIC PIPING
23 21 16 HYDRONIC EQUIPMENT AND SPECIALTIES
23 31 13 METAL DUCTS AND VENTILATION EQUIPMENT
23 35 16.10 ENGINE EXHAUST AND CRANK VENT PIPING

DIVISION 26 – ELECTRICAL

26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
26 05 02 BASIC ELECTRICAL MATERIALS AND METHODS
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 23 00 LOW-VOLTAGE SWITCHGEAR
26 32 13 ENGINE GENERATORS
26 55 33 HAZARD WARNING LIGHTING

DIVISION 31 – EARTHWORK

31 11 00 CLEARING AND GRUBBING
31 23 00 EXCAVATION AND FILL
31 23 19 DEWATERING AND CONTROL OF SURFACE WATER
31 62 16 HELICAL PILE
31 62 17 H-PILE FOUNDATIONS

DIVISION 33 – UTILITIES

33 71 00 ELECTRICAL UTILITIES
33 71 02 DISTRIBUTION CONDUCTORS
33 71 16 ELECTRICAL UTILITY POLE
33 72 16 LIQUID-FILLED UTILITY TRANSFORMERS
33 77 53 MEDIUM VOLTAGE UTILITY RECLOSERS
33 77 53.01 MEDIUM-VOLTAGE VACUUM SWITCHES

DRAWINGS.....(Bound Separately)

ALASKA ENERGY AUTHORITY

INVITATION TO BID

for Construction Contract

Date September 18, 2018

**Twin Hills Power System Upgrade
19023**

Location of Project: Twin Hills, Alaska

Contracting Officer: Jake Tibbe

Issuing Office: ALASKA ENERGY AUTHORITY (AUTHORITY)

State Funded []

Federal Aid [x]

Description of Work: Work under this Contract is for the construction of an electrical intertie in Twin Hills, Alaska. There are 3 additive alternates that include the construction of distribution system upgrades, standby power module, and distribution South extension. See Specification Section 011000 Summary of Work for detailed descriptions of each bid item and additive alternate.

The Engineer's Estimate is between **\$3,000,000 - \$4,000,000**

All work shall be substantially completed by: **March 15, 2021**

Interim Completion dates, if applicable, will be shown in the General Requirements.

Bidders are invited to submit sealed bids, in single copy, for furnishing all labor, equipment, and materials and for performing all work for the project described above. Bids will be opened publicly at 2:00 pm local time, in the Willow conference room, 813 West Northern Lights Blvd., Anchorage, Alaska on October 16, 2018.

SUBMISSION OF BIDS

ALL BIDS INCLUDING ANY AMENDMENTS OR WITHDRAWALS MUST BE RECEIVED PRIOR TO BID OPENING. BIDS SHALL BE SUBMITTED ON THE FORMS FURNISHED AND MUST BE IN A SEALED ENVELOPE MARKED AS FOLLOWS:

Bid for Project:
Twin Hills Power System Upgrades
Project Number: 19023

ATTN: Procurement (Jake Tibbe)
Alaska Energy Authority
813 West Northern Lights Blvd.
Anchorage, AK 99503

Bids, amendments or withdrawals transmitted by mail must be received in the above specified post office box no later than 7 hours prior to the scheduled time of bid opening. Hand-delivered bids, amendments or withdrawals must be received by the **Front Desk of the Alaska Energy Authority**, prior to the scheduled time of bid opening. Emailed bid amendments must be addressed to **Jake Tibbe**, Email: jtibbe@aidea.org

A bid guaranty is required with each bid in the amount of 5% of the amount bid. (Alternate bid items as well as supplemental bid items appearing on the bid schedule shall be included as part of the total amount bid when determining the amount of bid guaranty required for the project.)

The Authority hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this Invitation, Disadvantaged Business Enterprises (DBEs) will be afforded full opportunity to submit bids and will not be discriminated against on the grounds of race, color, national 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:

See attached Special Notice to Bidders for this project.

Electronic Plans and Specifications may be ordered, for the price of \$0.00 from:

Alaska Energy Authority
813 West Northern Lights Blvd.
Anchorage, AK 99503

Phone: (907) 771-3990

All questions relating to design features, constructability, quantities, or other 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:

Rebecca Garrett, Project Manager Phone: (907) 771- 3042

Fax: (907) 771-3044

³ All questions concerning bidding procedures should be directed to:

Jake Tibbe
Contracting Officer
813 West Northern Lights Blvd.
Anchorage, AK 99503

Phone: (907) 771-3990 Email: jtibbe@AIDEA.Org

The Bid Calendar, Planholder lists, and Bid Results information are available on the Internet at: www.aidea.org under Procurement Opportunities.

Reminder: 3 AAC 109.220 requires all Bidders to have a valid Alaska Business License and an Alaska Contractor's Certificate of Registration prior to award. To qualify as an Alaska bidder under 3 AAC 109.220, a bidder shall have a valid Alaska business license at time designated in the invitation to bid for bid opening.

ALASKA ENERGY AUTHORITY
INFORMATION TO BIDDERS

The Authority 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. The person signing the proposal must initial any erasures or changes made to the bid.
- (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 25D-14), or a certified check, cashier's check or money order made payable to the Alaska Energy Authority. 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 non-responsive. Telegraphic notification of execution of Bid Bond does not meet the requirements of bid security accompanying the bid. An individual surety will not be accepted as a bid security.

The Authority will hold the bid securities of the two lowest bidders until the Contract has been executed, after which they will be returned. All other 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 Authority 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 To Bid. 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 the bidder received no addenda, the word "None" should be shown as specified.

Every effort will be made by the Authority 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, 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 To Bid. 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 To Bid.

All questions must be received 72 hours before the bid opening. Questions submitted after the deadline may be rejected by the Authority.

WITHDRAWAL OR REVISION OF BIDS

A bidder may withdraw or revise a bid after it has been deposited with the Authority, 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.

Emailed 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 25D-16 shall be used to submit such modifications.

RECEIPT AND OPENING OF BIDS

- (a) The Authority must receive all bids, including any amendment or withdrawal prior to the scheduled time of bid opening. Any bid, amendment, or withdrawal that has not actually been received by the Authority 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 Authority for the premature opening of, or failure to open, a bid improperly addressed or identified.
- (c) The Authority 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 Authority 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 Authority'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 Authority 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.

ALASKA ENERGY AUTHORITY

SUPPLEMENTARY INFORMATION TO BIDDERS

This document modifies or adds to the provisions of Alaska Energy Authority's form 25D-3, INFORMATION TO BIDDERS.

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 AUTHORITY 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 nonresponsive."

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 AUTHORITY's intent to Award the Contract and the successful Bidder will be requested to execute certain documents, including the Contract form and bonds."

SECTION 00115

ITEM G-115 WORKER MEALS AND LODGING, OR PER DIEM

DESCRIPTION

115-1.1 This item consists of complying with the Alaska Department of Labor and Workforce Development (DOLWD) requirements for Worker Meals and Lodging, or Per Diem; as described in their May 10, 2013 memo WHPL #197(A4) and the State Laborer's and Mechanic's Minimum Rates of Pay (current issue).

Ensure subcontractors comply with the DOLWD requirements. The direct internet address is <http://www.labor.state.ak.us/lss/pamp600.htm>.

Ensure facilities meet the Alaska Administrative Code 8 AAC 61.1010 and 8 AAC 61.1040 *Occupational Safety and Health Standards*, 18 AAC 31 *Alaska Food Code*, and U. S. Code of Federal Regulations 29 CFR Section 1910.142 *Temporary Labor Camps*.

Do not consider the cost of Meals and Lodging or Per Diem in setting wages for the worker or in meeting wage requirements under AS 23.10.065 or AS 36.05.

METHOD OF MEASUREMENT

115-2.1 Worker Meals and Lodging, or Per Diem will not be measured.

BASIS OF PAYMENT

115-3.1 Payment for Worker Meals and Lodging, or Per Diem is subsidiary to the contract.

Special Notice to Bidders

1. A non-mandatory pre-bid meeting is scheduled for September 27, 2018, 1:00pm in the Aspen Conference room. This is not a mandatory meeting, and there will not be a scheduled site visit prior to the bid opening. Attend by teleconference dial 1-888-585-9008 and when prompted enter code 434756425#.
2. Bidders are hereby notified that the following data (pdfs) to assist in preparing bids are available for viewing online:
 - a. TH-Dist-StakeSheet_IFC 8-2018
 - b. TH-TileLine-StakeSheet_IFC 8-2018

REQUIRED DOCUMENTS

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 25D-9)**
 2. **Bid Schedule**
 3. **Bid Security**
 4. Any bid revisions must be submitted by the bidder prior to bid opening on the following form:
Bid Modification (Form 25D-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 25D-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. **Construction Contract (Form 25D-10A)**
2. **Payment Bond (Form 25D-12)**
3. **Performance Bond (Form 25D-13)**
4. **Contractor's Questionnaire (Form 25D-8)**
5. **Certificate of Insurance (from carrier)**

PROPOSAL
of

NAME _____

ADDRESS _____

To the CONTRACTING OFFICER, ALASKA ENERGY AUTHORITY:

In compliance with your Invitation To Bid dated **September 18, 2018**, the Undersigned proposes to furnish and deliver all the materials and do all the work and labor required in the construction of Project:

Project Name

Twin Hills Power System Upgrades

Project No. 19023

Located at **Twin Hills, Alaska**, according to the plans and specifications and for the amount and prices named herein as indicated on the Bid Schedule consisting of **2** 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 proposal, and it is hereby mutually understood and agreed that in case the Undersigned does not, the accompanying bid guarantee shall be forfeited to the Alaska Energy Authority, 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 after the effective date of Notice to Proceed and to substantially complete the work by **March 15, 2021**, unless extended in writing by the Contracting Officer. Final inspection and completion shall be on or before **June 30, 2021** unless extended in writing by the Contracting Officer.

The Undersigned proposes to furnish Payment Bond in the amount of 100% (of the contract) and Performance Bond in the amount of 100% (of the contract), as surety conditioned for the full, complete and faithful performance of this contract.

The Undersigned acknowledges receipt of the following addenda to the drawings and/or specifications (give number and date of each).

Addendum Number	Date Issued

Addendum Number	Date Issued

Addendum Number	Date Issued

NON-COLLUSION AFFIDAVIT

The Undersigned declares, under penalty of perjury under the laws of the United States, that neither he nor the firm, association, or corporation of which he is a member, has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this bid.

The Undersigned has read the foregoing proposal and hereby agrees to the conditions stated therein by affixing his signature below:

Signature

Name and Title of Person Signing

Telephone Number

Fax Number

BID SCHEDULE

Twin Hills Power System Upgrade

Project No. 19023

Bidders Please Note: Before preparing this bid schedule, read carefully, "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.

Contract award shall be made on the basis of the total Base Bid plus additive alternates as selected by Alaska Energy Authority. If Bid Alternates are included in the Bid Documents, the Alaska Energy Authority reserves the right to award some, none, or all of the alternates. Alternates may be awarded in any order in the best interest of the Alaska Energy Authority

Conditioned or qualified bids will be considered non-responsive.

Item	Description	Quantity	Unit	Unit Price	Extended Total Amount
BASE BID:					
1	Construct Electrical Intertie	1	LS	\$	\$
2	Local Hire Allowance	1	Contingent Sum	\$50,000	\$50,000
BASE BID: TOTAL OF ITEMS FROM ABOVE					\$
ADDITIVE ALTERNATES:					
A	Construct Twin Hills Distribution System Upgrades	1	LS	\$	\$
B	Construct Standby Power Module	1	LS	\$	\$
C	Construct Twin Hills Distribution South Extension	1	LS	\$	\$
TOTAL BID: SUM OF BASE BID AND ADDITIVE ALTERNATES					\$
Bidder is required to bid on all bid items, including all Additive Alternates.					
See Specification Section 011000 Summary of Work for detailed descriptions of each bid item and additive alternate.					

Contractor's Name (Printed)

Alaska Contractor's Registration #

Expires

Alaska Business License #

Expires

Email

ALASKA ENERGY AUTHORITY

BID BOND

For

**Twin Hills Power System Upgrade
19023**

DATE BOND EXECUTED: _____

PRINCIPAL (Legal name and business address):

TYPE OF ORGANIZATION:

	<input type="checkbox"/> Individual	<input type="checkbox"/> Partnership
	<input type="checkbox"/> Joint Venture	<input type="checkbox"/> Corporation
STATE OF INCORPORATION:		

SURETY(IES) (Name and business address):

A.	B.	C.

PENAL SUM OF BOND:	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 the above-referenced Project in accordance with contract documents filed in the office of the Contracting Officer, and under the Invitation To Bid 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

CORPORATE SURETY(IES)

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

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

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

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.

BID MODIFICATION

**Twin Hills Power System Upgrade
19023**

Modification Number: _____

Note: All revisions shall be made to the unadjusted bid amount(s).

Changes to the adjusted bid amounts will be computed by the Authority.

PAY ITEM NO.	PAY ITEM DESCRIPTION	REVISION TO UNIT BID PRICE +/-	REVISION TO BID AMOUNT +/-

TOTAL REVISION: \$ _____

Name of Bidding Firm

Responsible Party Signature

Date

This form may be duplicated if additional pages are needed.

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

CONSTRUCTION CONTRACT

Twin Hills Power System Upgrade 19023

This CONTRACT, between the ALASKA ENERGY AUTHORITY, herein called the Authority, 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 Authority, 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 Authority. In no event shall the Authority 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 Authority. 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 Authority, on or before: _____ or within _____ calendar days. 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 Authority, to complete the furnishing and delivery of materials and the doing and performance of the work before the aforesaid date, the Authority 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 Authority shall have the right to recover _____ Dollars (\$ _____) 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 Name and Title

Date

(Corporate Seal)

ALASKA ENERGY AUTHORITY

Signature of Contracting Officer

Typed Name

Date

ALASKA ENERGY AUTHORITY

PERFORMANCE BOND

Bond No. _____

For
**Twin Hills Power System Upgrade
19023**

KNOW ALL WHO SHALL SEE THESE PRESENTS:

That _____
of _____ as Principal,
and _____
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 payment whereof, well and truly to be paid to the State of Alaska, we bind ourselves, our heirs, successors, executors, administrators, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has entered into a written contract with said State of Alaska, on the _____ of _____ A.D., 20____, for construction of the above-named project, said work to be done according to the terms of said contract.

Now, THEREFORE, the conditions of the foregoing obligation are such that if the said Principal shall well and truly perform and complete all obligations and work under said contract and if the Principal shall reimburse upon demand of the Alaska Energy Authority any sums paid him which exceed the final payment determined to be due upon completion of the project, then these presents shall become null and void; otherwise they shall remain in full force and effect.

IN WITNESS WHEREOF, we have hereunto set our hands and seals at _____, _____ this _____ day of _____ A.D., 20____.

Principal: _____

Address: _____

By: _____

Contact Name: _____

Phone: () _____

Surety: _____

Address: _____

By: _____

Contact Name: _____

Phone: () _____

The offered bond has been checked for adequacy under the applicable statutes and regulations:

Alaska Energy Authority 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.

ALASKA ENERGY AUTHORITY

PAYMENT BOND

Bond No. _____

For

**Twin Hills Power System Upgrade
19023**

NOW ALL WHO SHALL SEE THESE PRESENTS:

That _____
of _____ as Principal,
and _____
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 payment whereof, well and truly to be paid to the State of Alaska, we bind ourselves, our heirs, successors, executors, administrators, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has entered into a written contract with said State of Alaska, on the _____ of _____ A.D., 20____, for construction of the above-referenced project, said work to be done according to the terms of said contract.

Now, THEREFORE, the conditions of the foregoing obligation are such that if the said Principal shall comply with all requirements of law and pay, as they become due, all just claims for labor performed and materials and supplies furnished upon or for the work under said contract, whether said labor be performed and said materials and supplies be furnished under the original contract, any subcontract, or any and all duly authorized modifications thereto, then these presents shall become null and void; otherwise they shall remain in full force and effect.

IN WITNESS WHEREOF, we have hereunto set our hands and seals at _____, this _____ day of _____ A.D., 20____.

Principal: _____

Address: _____

By: _____

Contact Name: _____

Phone: () _____

Surety: _____

Address: _____

By: _____

Contact Name: _____

Phone: () _____

The offered bond has been checked for adequacy under the applicable statutes and regulations:

Alaska Energy Authority Authorized Representative

Date

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

**Twin Hills Power System Upgrade
19023**

A. FINANCIAL

1. 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. Have you had previous construction contracts or subcontracts with the Authority?
[] 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

Signature

Date

ALASKA ENERGY AUTHORITY
SECTION 00 70 00
GENERAL CONDITIONS

- ARTICLE 1 DEFINITIONS

- ARTICLE 2 AUTHORIZATION AND LIMITATIONS
 - 2.1 Authorities and Limitations
 - 2.2 Evaluations by Contracting Officer
 - 2.3 Means and Methods
 - 2.4 Visits to Site

- ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE
 - 3.1 Incomplete Contract Documents
 - 3.2 Copies of Contract Documents
 - 3.3 Scope of Work
 - 3.4 Intent of Contract Documents
 - 3.5 Discrepancy in Contract Documents
 - 3.6 Clarifications and Interpretations
 - 3.7 Reuse of Documents

- ARTICLE 4 LANDS AND PHYSICAL CONDITIONS
 - 4.1 Availability of Lands
 - 4.2 Visit to Site
 - 4.3 Explorations and Reports
 - 4.4 Utilities
 - 4.5 Damaged Utilities
 - 4.6 Utilities Not Shown or Indicated
 - 4.7 Survey Control

- ARTICLE 5 BONDS AND INSURANCE, AND INDEMNIFICATION
 - 5.1 Delivery of Bonds
 - 5.2 Bonds
 - 5.3 Replacement of Bond and Surety
 - 5.4 Insurance Requirements
 - 5.5 Indemnification

- ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES
 - 6.1 Supervision of Work
 - 6.2 Superintendence by CONTRACTOR
 - 6.3 Character of Workers
 - 6.4 CONTRACTOR to Furnish
 - 6.5 Materials and Equipment
 - 6.6 Anticipated Schedules
 - 6.7 Finalizing Schedules
 - 6.8 Adjusting Schedules
 - 6.9 Substitutes or "Or-Equal" Items
 - 6.10 Substitute Means and Methods
 - 6.11 Evaluation of Substitution
 - 6.12 Dividing the Work
 - 6.13 Subcontractors

6.14	Use of Premises
6.15	Structural Loading
6.16	Record Documents
6.17	Safety and Protection
6.18	Safety Representative
6.19	Emergencies
6.20	Shop Drawings and Samples
6.21	Shop Drawing and Sample Review
6.22	Maintenance during Construction
6.23	Continuing the Work
6.24	Consent to Assignment
6.25	Use of Explosives
6.26	CONTRACTOR's Records
6.27	Load Restrictions
ARTICLE 7	LAWS AND REGULATIONS
7.1	Laws to be observed
7.2	Permits, Licenses, and Taxes
7.3	Patented Devices, Materials and Processes
7.4	Compliance of Specifications and Drawings
7.5	Accident Prevention
7.6	Sanitary Provisions
7.7	Business Registration
7.8	Professional Registration and Certification
7.9	Local Building Codes
7.10	Air Quality Control
7.11	Archaeological or Paleontological Discoveries
7.12	Applicable Alaska Preferences
7.13	Preferential Employment
7.14	Wages and Hours of Labor
7.15	Overtime Work Hours and Compensation
7.16	Covenants against Contingent Fees
7.17	Officials Not to Benefit
7.18	Personal Liability of Public Officials
ARTICLE 8	OTHER WORK
8.1	Related Work at Site
8.2	Access, Cutting, and Patching
8.3	Defective Work by Others
8.4	Coordination
ARTICLE 9	CHANGES
9.1	AUTHORITY's Right to Change
9.2	Authorization of Changes within the General Scope
9.3	Directive
9.4	Change Order
9.5	Shop Drawing Variations
9.6	Changes outside the General Scope; Supplemental Agreement
9.7	Unauthorized Work
9.8	Notification of Surety
9.9	Differing Site Conditions

9.10 Interim Work Authorization

ARTICLE 10 CONTRACT PRICE; COMPUTATION AND CHANGE

- 10.1 Contract Price
- 10.2 Claims for Price Change
- 10.3 Change Order Price Determination
- 10.4 Cost of the Work
- 10.5 Excluded Costs
- 10.6 CONTRACTOR's Fee
- 10.7 Cost Breakdown
- 10.8 Cash Allowances
- 10.9 Unit Price Work
- 10.10 Determinations for Unit Prices

ARTICLE 11 CONTRACT TIME, COMPUTATION AND CHANGE

- 11.1 Commencement of Contract Time; Notice to Proceed
- 11.2 Starting the Work
- 11.3 Computation of Contract Time
- 11.4 Time Change
- 11.5 Extension Due to Delays
- 11.6 Essence of Contract
- 11.7 Reasonable Completion Time
- 11.8 Delay Damages

ARTICLE 12 QUALITY ASSURANCE

- 12.1 Warranty and Guaranty
- 12.2 Access to Work
- 12.3 Tests and Inspections
- 12.4 Uncovering Work
- 12.5 AUTHORITY May Stop the Work
- 12.6 Correction or Removal of Defective Work
- 12.7 One Year Correction Period
- 12.8 Acceptance of Defective Work
- 12.9 AUTHORITY may Correct Defective Work

ARTICLE 13 PAYMENTS TO CONTRACTOR AND COMPLETION

- 13.1 Schedule of Values
- 13.2 Preliminary Payments
- 13.3 Application for Progress Payment
- 13.4 Review of Applications for Progress Payments
- 13.5 Stored Materials and Equipment
- 13.6 CONTRACTOR's Warranty of Title
- 13.7 Withholding of Payments
- 13.8 Retainage
- 13.9 Request for Release of funds
- 13.10 Substantial Completion
- 13.11 Access Following Substantial Completion
- 13.12 Final Inspection
- 13.13 Final Completion and Application for Payment
- 13.14 Final Payment

- 13.15 Final Acceptance
- 13.16 CONTRACTOR's Continuing Obligation
- 13.17 Waiver of Claims by CONTRACTOR
- 13.18 No Waiver of Legal Rights

ARTICLE 14 SUSPENSION OF WORK AND TERMINATION

- 14.1 AUTHORITY May Suspend Work
- 14.2 Default of Contract
- 14.3 Rights or Remedies
- 14.4 Convenience Termination

ARTICLE 15 CLAIMS AND DISPUTES

- 15.1 Notification
- 15.2 Presenting Claim
- 15.3 Claim Validity, Additional Information & Authority's Action
- 15.4 Contracting Officer's Decision
- 15.5 Appeals on a Contract Claim
- 15.6 Construction Contract Claim Appeal
- 15.7 Fraud and Misrepresentation in Making a Claim

ARTICLE 1 - DEFINITIONS

Wherever used in the Contract Documents the following terms, or pronouns in place of them, are used, the intent and meaning, unless a different intent or meaning is clearly indicated, shall be interpreted as set forth below.

The titles and headings of the articles, sections, and subsections herein are intended for convenience of reference.

Terms not defined below shall have their ordinary accepted meanings within the context which they are used. Words which have a well-known technical or trade meaning when used to describe work, materials or equipment shall be interpreted in accordance with such meaning. Words defined in Article 1 are to be interpreted as defined.

Addenda - All clarifications, corrections, or changes issued graphically or in writing by the AUTHORITY after the Advertisement but prior to the opening of Proposals.

Advertisement - The public announcement, as required by law, inviting bids for Work to be performed or materials to be furnished.

Application for Payment - The form provided by the AUTHORITY which is to be used by the CONTRACTOR in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Approved or Approval - Means written approval by the Contracting Officer or his authorized representative as defined in Article 2.1. 'Approved' or 'Approval' as used in this contract document shall mean that the Authority has received a document, form or submittal from the Contractor and that the Authority has taken "No exceptions" to the item submitted. Unless the context clearly indicates otherwise, approved or approval shall not mean that the Authority approves of the methods or means, or that the item or form submitted meets the requirements of the contract or constitutes acceptance of the Contractor's work. Where approved or approval means acceptance, then such approval must be set forth in writing and signed by the contracting officer or his designee.

A.S - Initials which stand for Alaska Statute.

Authority - The Alaska Energy Authority (AEA). References to "Contracting Agency" means the AUTHORITY. The AUTHORITY is acting as an agent for Owner.

Award - The acceptance, by the AUTHORITY, of the successful bid.

Bid Bond - A type of Proposal Guaranty.

Bidder - Any individual, firm, corporation or any acceptable combination thereof, or joint venture submitting a bid for the advertised Work.

Calendar Day - Every day shown on the calendar, beginning and ending at midnight.

Change Order - A written order by the AUTHORITY directing changes to the Contract Documents, within their general scope.

Consultant - The person, firm, or corporation retained directly by the AUTHORITY to prepare Contract Documents, perform construction administration services, or other Project related services. References to Authority's Consultants shall include Engineer.

Contingent Sum Work Item - When the bid schedule contains a Contingent Sum Work Item, the Work covered shall be performed only upon the written Directive of the Project Manager. Payment shall be made as provided in the Directive.

Contract - The written agreement between the AUTHORITY and the CONTRACTOR setting forth the obligations of the parties and covering the Work to be performed, all as required by the Contract Documents.

Contract Documents - The Contract form, Addenda, the bidding requirements and CONTRACTOR's bid (including all appropriate bid tender forms), the bonds, the Conditions of the Contract and all other Contract requirements, the Specifications, and the Drawings furnished by the AUTHORITY to the CONTRACTOR, together with all Change Orders and documents approved by the Contracting Officer, for inclusion, modifications and supplements issued on or after the Effective Date of the Contract.

Contracting Officer - The person authorized by the Executive Director to enter into and administer the Contract on behalf of the AUTHORITY; who has authority to make findings, determinations and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract. The Contracting Officer is identified on the construction Contract.

Contractor - The individual, firm, corporation or any acceptable combination thereof, contracts with the AUTHORITY for performance of the Work.

Contract Price - The total moneys payable by the AUTHORITY to the CONTRACTOR under the terms of the Contract Documents.

CONTRACTOR's Release – CONTRACTOR's written notification to the AUTHORITY specifying final payment due and releasing the AUTHORITY of any and all claims.

Contract Time - The number of Calendar Days following issuance of Notice-to-Proceed in which the project shall be rendered Substantially Complete, or if specified as a calendar date, the Substantial Completion date specified in the Contract Documents.

Controlling Item - Any feature of the Work on the critical path of a network schedule.

Defective - Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents.

Directive - A written communication to the CONTRACTOR from the Contracting Officer interpreting or enforcing a Contract requirement or ordering commencement of an item of Work.

Drawings - The Drawings which show the character and scope of the Work to be performed and which have been furnished by the AUTHORITY and are by reference made a part of the Contract Documents.

Engineer - The person, firm, or corporation retained directly by the AUTHORITY to prepare Contract Documents, perform construction administration services, or other Project related services.

Equipment - All machinery together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work.

Final Completion - The Project has progressed to the point that all required Work is complete..

Furnish - To procure, transport, and deliver to the project site materials, labor, or equipment, for installation or use on the project.

General Requirements - Sections of Division I of the Specifications which contain administrative and procedural requirements as well as requirements for temporary facilities which apply to Specification Divisions 2 through I6.

Holidays - In the State of Alaska, Legal Holidays occur on:

1. New Years Day - January 1
2. Martin Luther King's Birthday - Third Monday in January
3. President's Day - Third Monday in February
4. Seward's Day - Last Monday in March
5. Memorial Day - Last Monday in May
6. Independence Day - July 4
7. Labor Day - First Monday in September
8. Alaska Day - October 18
9. Veteran's Day - November 11
10. Thanksgiving Day - Fourth Thursday in November
11. Christmas Day - December 25
12. Every Sunday
13. Every day designated by public proclamation by the President of the United States or the Governor of the State as a legal Holiday.

If any Holiday listed above falls on a Saturday, Saturday and the preceding Friday are both legal Holidays. If the Holiday should fall on a Sunday, except (12) above, Sunday and the following Monday are both legal Holidays. See Title 44, Alaska Statutes.

Install - Means to build into the Work, ready to be used in complete and operable condition and in compliance with Contract Documents.

Interim Work Authorization - A written order by the Project Manager initiating changes to the Contract within its general scope, until a subsequent Change Order is executed.

Invitation for Bids - A portion of the bidding documents soliciting bids for the Work to be performed.

Materials - Any substances specified for use in the construction of the project.

Notice of Intent to Award - The written notice by the AUTHORITY to all Bidders identifying the apparent successful Bidder and establishing the AUTHORITY's intent to execute the Contract when all conditions required for execution of the Contract are met.

Notice to Proceed - A written notice to the CONTRACTOR to begin the Work and establishing the date on which the Contract Time begins.

Onsite Project Representative - The Engineer's authorized representative assigned to make detailed observations relating to contract performance.

Owner – Means Grantee for whom the ALASKA ENERGY AUTHORITY is acting as an agent of.

Payment Bond - The security furnished by the CONTRACTOR and his Surety to guarantee payment of the debts covered by the bond.

Performance Bond - The security furnished by the CONTRACTOR and his Surety to guarantee performance and completion of the Work in accordance with the Contract.

Pre-construction Conference - A meeting between the CONTRACTOR, Project Manager and the Engineer, and other parties affected by the construction, to discuss the project before the CONTRACTOR begins work.

Project Manager - The authorized representative of the Contracting Officer who is responsible for administration of the Contract.

Project - The total construction, of which the Work performed under the Contract Documents, is the whole or a part, where such total construction may be performed by more than one CONTRACTOR.

Proposal - The offer of a Bidder, on the prescribed forms, to perform the Work at the prices quoted.

Proposal Guaranty - The security furnished with a Proposal to guarantee that the bidder will enter into a Contract if his Proposal is accepted by the AUTHORITY.

Quality Assurance (QA) - Where referred to in the technical specifications (Divisions 2 through 16), Quality Assurance refers to measures to be provided by the CONTRACTOR as specified.

Quality Control (QC) - Tests and inspections by the CONTRACTOR to insure the acceptability of materials incorporated into the work. QC test reports are used as a basis upon which to determine whether the Work conforms to the requirements of the Contract Documents and to determine its acceptability for payment.

Regulatory Requirements - Laws, rules, regulations, ordinances, codes and/or orders.

Schedule of Values - Document submitted by the CONTRACTOR and reviewed by the Contracting Officer, which shall serve as the basis for computing payment and for establishing the value of separate items of Work which comprise the Contract Price.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the CONTRACTOR to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by the CONTRACTOR to illustrate material, equipment, fabrication, or erection for some portion of the Work. Where used in the Contract Documents, "Shop Drawings" shall also mean "Submittals".

Specifications - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative and procedural details applicable thereto.

Subcontractor - An individual, firm, or corporation to whom the CONTRACTOR or any other Subcontractor sublets part of the Contract.

Substantial Completion - Although not fully completed, the Work (or a specified part thereof) has progressed to the point where it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended. The terms "Substantially Complete" and "Substantially Completed" as applied to any Work refer to Substantial Completion thereof.

Supplemental Agreement - A written agreement between the CONTRACTOR and the AUTHORITY covering work that is not within the general scope of the Contract.

Supplementary Conditions - The part of the Contract Documents which amends or supplements these General Conditions.

Supplier - A manufacturer, fabricator, distributor, material man, or vendor of materials or equipment.

Surety - The corporation, partnership, or individual, other than the CONTRACTOR, executing a bond furnished by the CONTRACTOR.

Unit Price Work - Work to be paid for on the basis of unit prices.

Utility - The privately, publicly or cooperatively owned lines, facilities and systems for producing, transmitting or distributing communications, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm water not connected with highway or street drainage, and other similar commodities, including publicly owned fire and police signal systems, street lighting systems, and railroads which directly or indirectly serve the public or any part thereof. The term "utility" shall also mean the utility company, inclusive of any wholly owned or controlled subsidiary."

Work - Work is the act of, and the result of, performing services, furnishing labor, furnishing and incorporating materials and equipment into the Project and performing other duties and obligations, all as required by the Contract Documents. Such Work, however incremental, will culminate in the entire completed Project, or the various separately identifiable parts thereof.

ARTICLE 2 – AUTHORIZATION AND LIMITATIONS

2.1 Authorities and Limitations

- 2.1.1 The Contracting Officer alone shall have the power to bind the AUTHORITY and to exercise the rights, responsibilities, authorities and functions vested in the Contracting Officer by the Contract Documents. The Contracting Officer shall have the right to designate in writing authorized representatives to act for him. Wherever any provision of the Contract Documents specifies an individual or organization, whether governmental or private, to perform any act on behalf of or in the interest of the AUTHORITY that individual or organization shall be deemed to be the Contracting Officer's authorized representative under this Contract but only to the extent so specified.
- 2.1.2 The CONTRACTOR shall perform the Work in accordance with any written order (including but not limited to instruction, direction, interpretation or determination) issued by an authorized representative in accordance with the authorized representative's authority to act for the Contracting Officer. The CONTRACTOR assumes all the risk and consequences of performing the Work in accordance with any order (including but not limited to instruction, direction, interpretation or determination) of anyone not authorized to issue such order, and of any order not in writing.
- 2.1.3 The performance or nonperformance of the Contracting Officer or his authorized representative, shall not give rise to any contractual obligation or duty to the CONTRACTOR, any Subcontractor, any Supplier, or any other organization performing any of the Work or any Surety representing them.

2.2 Evaluations by Contracting Officer:

- 2.2.1 The Contracting Officer or his authorized representative will decide all questions which may arise as to:
- a. Quality and acceptability of materials furnished;
 - b. Quality and acceptability of Work performed;
 - c. Compliance with the schedule of progress;
 - d. Interpretation of Contract Documents;
 - e. Acceptable fulfillment of the Contract on the part of the CONTRACTOR.
- 2.2.2 In order to avoid cumbersome terms and confusing repetition of expressions in the Contract Documents the terms "as ordered", "as directed", "as required", "as approved" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used it shall be understood as if the expression were followed by the words "the Contracting Officer".

When such terms are used to describe a requirement, direction, review or judgment of the Contracting Officer as to the Work, it is intended that such requirement, direction,

review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise).

- 2.2.3 The use of any such term or adjective shall not be effective to assign to the AUTHORITY any duty of authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraphs 2.3 or 2.4.

2.3 Means & Methods:

The means, methods, techniques, sequences or procedures of construction, or safety precautions and the program incident thereto, and the failure to perform or furnish the Work in accordance with the Contract Documents are the sole responsibility of the CONTRACTOR.

2.4 Visits to Site/Place of Business:

The Contracting Officer will make visits to the site and approved remote storage sites at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. The Contracting Officer may, at reasonable times, inspect that part of the plant or place of business of the CONTRACTOR or Subcontractor that is related to the performance of the Contract. Such observations or the lack of such observations shall in no way relieve the CONTRACTOR from his duty to perform the Work in accordance with the Contract Documents.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Incomplete Contract Documents:

The submission of a bid by the Bidder is considered a representation that the Bidder examined the Contract Documents to make certain that all sheets and pages were provided and that the Bidder is satisfied as to the conditions to be encountered in performing the Work. The AUTHORITY expressly denies any responsibility or liability for a bid submitted on the basis of an incomplete set of Contract Documents.

3.2 Copies of Contract Documents:

The AUTHORITY shall furnish to the CONTRACTOR up to six copies of the Contract Documents. Additional copies will be furnished, upon request, at the cost of reproduction.

3.3 Scope of Work:

The Contract Documents comprise the entire Contract between the AUTHORITY and the CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the Regulatory Requirements of the place of the Project.

It is specifically agreed between the parties executing this Contract that it is not intended by any of the provisions of the Contract to create in the public or any member thereof a third party benefit, or to authorize anyone not a party to this Contract to maintain a suit pursuant to the terms or provisions of the Contract.

3.4 Intent of Contract Documents:

- 3.4.1 It is the intent of the Contract Documents to describe a functionally complete Project to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied, without any adjustment in Contract Price or Contract Time, whether or not specifically called for.
- 3.4.2 Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Regulatory Requirements of any governmental authority, whether such reference be specific or by implication, shall mean the edition stated in the Contract Documents or if not stated the latest standard specification, manual, code or Regulatory Requirements in effect at the time of Advertisement for the Project (or, on the Effective Date of the Contract if there was no Advertisement). However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the AUTHORITY and the CONTRACTOR, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the AUTHORITY or any of the AUTHORITY's Consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraphs 2.3.

3.5 Discrepancy in Contract Documents:

- 3.5.1 Before undertaking the Work, the CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures, and dimensions shown thereon and all applicable field measurements. Work in the area by the CONTRACTOR shall imply verification of figures, dimensions and field measurements. If, during the above study or during the performance of the Work, the CONTRACTOR finds a conflict, error, discrepancy or omission in the Contract Documents, or a discrepancy between the Contract Documents and any standard specification, manual, code, or Regulatory Requirement which affects the Work, the CONTRACTOR shall promptly report such discrepancy in writing to the Contracting Officer. The CONTRACTOR shall obtain a written interpretation or clarification from the Contracting Officer before proceeding with any Work affected thereby. Any adjustment made by the CONTRACTOR without this determination shall be at his own risk and expense. However, the CONTRACTOR shall not be liable to the AUTHORITY for failure to report any conflict, error or discrepancy in the Contract Documents unless the CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

3.5.2 Discrepancy - Order of Precedence:

When conflicts errors or discrepancies within the Contract Documents exist, the order of precedence from most governing to least governing will be as follows:

Contents of Addenda
Supplementary Conditions
General Conditions
General Requirements
Technical Specifications

Drawings
Recorded dimensions will govern over scaled dimensions
Large scale details over small scale details
Schedules over plans
Architectural drawings over structural drawings Structural drawings over mechanical and electrical drawings

3.6 Clarifications and Interpretations:

The Contracting Officer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as the Contracting Officer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

3.7 Reuse of Documents:

Neither the CONTRACTOR nor any Subcontractor, or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with the AUTHORITY shall have or acquire any title to or ownership rights in any of the Contract Documents (or copies thereof) prepared by or for the AUTHORITY and they shall not reuse any of the Contract Documents on extensions of the Project or any other project without written consent of the Contracting Officer.

Contract Documents prepared by the CONTRACTOR in connection with the Work shall become the property of the AUTHORITY.

ARTICLE 4 - LANDS AND PHYSICAL CONDITIONS

4.1 Availability of Lands:

The AUTHORITY shall furnish as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for use of the CONTRACTOR in connection with the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the AUTHORITY, unless otherwise provided in the Contract Documents. The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment. The CONTRACTOR shall provide all waste and disposal areas, including disposal areas for hazardous or contaminated materials, at no additional cost to the AUTHORITY.

4.2 Visit to Site:

The submission of a bid by the CONTRACTOR is considered a representation that the CONTRACTOR has visited and carefully examined the site and is satisfied as to the conditions to be encountered in performing the Work and as to the requirements of the Contract Documents.

4.3 Explorations and Reports:

Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by the AUTHORITY in preparation of the Contract Documents. The CONTRACTOR may for his purposes rely upon the accuracy of the factual data contained in such reports, but not upon interpretations or opinions drawn from such factual data contained therein or for the completeness or sufficiency thereof. Except as indicated in the immediately preceding sentence and in paragraphs 4.4 and 9.9, CONTRACTOR shall have full responsibility with respect to surface and subsurface conditions at the site.

4.4 Utilities:

- 4.4.1 The horizontal and vertical locations of known underground utilities as shown or indicated by the Contract Documents are approximate and are based on information and data furnished to the AUTHORITY by the owners of such underground utilities.
- 4.4.2 The CONTRACTOR shall have full responsibility for:
 - a. Reviewing and checking all information and data concerning utilities.
 - b. Locating all underground utilities shown or indicated in the Contract Documents which are affected by the Work.
 - c. Coordination of the Work with the owners of all utilities during construction.
 - d. Safety and protection of all utilities as provided in paragraph 6.17.
 - e. Repair of any damage to utilities resulting from the Work in accordance with 4.4.4 and 4.5.
- 4.4.3 If Work is to be performed by any utility owner, the CONTRACTOR shall cooperate with such owners to facilitate the Work.
- 4.4.4 In the event of interruption to any utility service as a result of accidental breakage or as result of being exposed or unsupported, the CONTRACTOR shall promptly notify the utility owner and the Project Manager. If service is interrupted, repair work shall be continuous until the service is restored. No Work shall be undertaken around fire hydrants until provisions for continued service has been approved by the local fire authority.

4.5 Damaged Utilities:

When utilities are damaged by the CONTRACTOR, the utility owner shall have the choice of repairing the utility or having the CONTRACTOR repair the utility. In the following circumstances, the CONTRACTOR shall reimburse the utility owner for repair costs or provide at no cost to the utility owner or the AUTHORITY, all materials, equipment and labor necessary to complete repair of the damage:

- a. When the utility is shown or indicated in the Contract Documents.
- b. When the utility has been located by the utility owner.

- c. When no locate was requested by the CONTRACTOR for utilities shown or indicated in the Contract Documents.
- d. All visible utilities.
- e. When the CONTRACTOR could have, otherwise, reasonably been expected to be aware of such utility.

4.6 Utilities Not Shown or Indicated:

If, while directly performing the Work, an underground utility is uncovered or revealed at the site which was not shown or indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.19) identify the owner of such underground utility and give written notice thereof to that owner and to the Project Manager. The Project Manager will promptly review the underground utility to determine the extent to which the Contract Documents and the Work should be modified to reflect the impacts of the discovered utility. The Contract Documents will be amended or supplemented in accordance with paragraph 9.2 and to the extent necessary through the issuance of a change document by the Contracting Officer. During such time, the CONTRACTOR shall be responsible for the safety and protection of such underground utility as provided in paragraph 6.17. The CONTRACTOR may be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are directly attributable to the existence of any underground utility that was not shown or indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of.

4.7 Survey Control:

The AUTHORITY will identify sufficient horizontal and vertical control data to enable the CONTRACTOR to survey and layout the Work. All survey work shall be performed under the direct supervision of a registered land surveyor when required by paragraph 7.8. Copies of all survey notes shall be provided to the AUTHORITY at an interval determined by the Project Manager. The Project Manager may request submission on a weekly or longer period at his discretion. Any variations between the Contract Documents and actual field conditions shall be identified in the survey notes. Survey notes are to be in a format acceptable to the AUTHORITY.

ARTICLE 5 - BONDS, INSURANCE, AND INDEMNIFICATION

5.1 Delivery of Bonds:

When the CONTRACTOR delivers the executed Contract to the Contracting Officer, the CONTRACTOR shall also deliver to the Contracting Officer such bonds as the CONTRACTOR may be required to furnish in accordance with paragraph 5.2.

5.2 Bonds:

- 5.2.1 The CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount as shown on the Contract as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These bonds shall remain in effect for one year after the date of Final Acceptance and until all obligations under this Contract, except special guarantees as per 12.7, have been met. All bonds shall be

furnished on forms provided by the AUTHORITY (or copies thereof) and shall be executed by such Sureties as are authorized to do business in the State of Alaska. The Contracting Officer may at his option copy the Surety with notice of any potential default or liability.

5.3 Replacement of Bond and Surety:

If the Surety on any bond furnished in connection with this Contract is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.2, or otherwise becomes unacceptable to the AUTHORITY, or if any such Surety fails to furnish reports as to his financial condition as requested by the AUTHORITY, the CONTRACTOR shall within five days thereafter substitute another bond and Surety, both of which must be acceptable to AUTHORITY.

An individual Surety may be replaced by a corporate Surety during the course of the Contract period. If the Surety desires to dispose of the collateral posted, the AUTHORITY may, at its option, accept substitute collateral.

5.4 Insurance Requirements:

5.4.1 The CONTRACTOR shall provide evidence of insurance with a carrier or carriers satisfactory to the AUTHORITY covering injury to persons and/or property suffered by the Alaska Energy Authority or a third party, as a result of operations which arise both out of and during the course of this Contract by the CONTRACTOR or by any Subcontractor. This coverage will also provide protection against injuries to all employees of the CONTRACTOR and the employees of any Subcontractor engaged in Work under this Contract. The delivery to the AUTHORITY of a written 30 day notice is required before cancellation of any coverage or reduction in any limits of liability. Insurance carriers shall have an acceptable financial rating.

5.4.2 The CONTRACTOR shall maintain in force at all times during the performance of Work under this agreement the following policies and minimum limits of liability. Where specific limits and coverages are shown, it is understood that they shall be the minimum acceptable. The requirements of this paragraph shall not limit the CONTRACTOR's responsibility to indemnify under paragraph 5.5. Additional insurance requirements specific to this Contract are contained in the Supplementary Conditions, when applicable.

a. Workers' Compensation Insurance: 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, to include:

1. Waiver of subrogation against the Authority and Employer's Liability Protection in the amount of \$500,000 each accident/\$500,000 each disease.
2. 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.

3. 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.
- b. Commercial General Liability Insurance: on an occurrence policy form covering all operations by or on behalf of the CONTRACTOR with combined single limits not less than:
 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
 2. If the CONTRACTOR carries a *Commercial General Liability* policy, the limits of liability shall not be less than:
 - \$1,000,000 each occurrence (Combined Single Limit for bodily injury and property damage)
 - \$1,000,000 for Personal Injury Liability
 - \$2,000,000 aggregate for Products-Completed Operations
 - \$2,000,000 general aggregate

The Authority and the Owner shall be named as "Additional Insured" under all liability coverages listed above.

- c. Automobile Liability Insurance: covering all vehicles used by the Contractor in the performance of services under this agreement with combined single limits not less than:
 - \$1,000,000 each occurrence
- d. Builder's Risk Insurance: Coverage shall be on an "All Risk" completed value basis including "quake and flood" and protect the interests of the AUTHORITY, the CONTRACTOR and Subcontractors at all tiers. Coverage shall include all materials, supplies and equipment that are intended for specific installation in the Project while such materials, supplies and equipment are located at the Project site, in transit from port of arrival to job site, or while temporarily located away from the Project site.

In addition to providing the above coverages the CONTRACTOR shall require that all indemnities obtained from any SUBCONTRACTORS be extended to include the Authority and Owner as an additional named indemnitees. CONTRACTOR shall further require that the Authority and the Owner be named as additional insured on all liability insurance policies maintained by all SUBCONTRACTORS under their contracts with CONTRACTOR, and that an appropriate waiver of subrogation in favor of the Authority be obtained with respect to all other insurance policies.

- e. Other Coverages: As specified in the Supplementary Conditions, if required.

5.4.3 a. In addition to providing the above coverages the Contractor shall, in any

contract or agreement with subcontractors performing work, require that all indemnities and waivers of subrogation it obtains, and that any stipulation to be named as an additional insured it obtains, also be extended to waive rights of subrogation against the AUTHORITY and the Owner and to add the ALASKA ENERGY AUTHORITY and the Owner as additional named indemnitees and as additional insured.

- b. Evidence of insurance shall be furnished to the AUTHORITY prior to the award of the contract. Such evidence, executed by the carrier's representative and issued to the AUTHORITY, shall consist of a certificate of insurance or the policy declaration page with required endorsements attached thereto which denote the type, amount, class of operations covered, effective (and retroactive) dates, and dates of expiration. Acceptance by the AUTHORITY of deficient evidence does not constitute a waiver of contract requirements.
- c. When a certificate of insurance is furnished, it shall contain the following statement:
"This is to certify that the policies described herein comply with all aspects of the insurance requirements of (Project Name and Number)."

5.5 Indemnification:

The CONTRACTOR shall indemnify, save harmless, and defend the AUTHORITY, the OWNER its agents and its employees from any and all claims, actions, or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from the CONTRACTOR or SUBCONTRACTOR's performance of WORK under this Contract; however, this provision has no effect if, but only if, the sole proximate cause of the injury or damage is the AUTHORITY's negligence.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 Supervision of Work:

The CONTRACTOR shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. All Work under this Contract shall be performed in a skillful and workmanlike manner. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

6.2 Superintendence by CONTRACTOR:

The CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent. The Project Manager shall be advised in writing of the superintendent's name, local address, and telephone number. This written advice is to be kept current until Final Acceptance by the AUTHORITY. The superintendent will be the CONTRACTOR's representative at the site and shall have full authority to act and sign documents on behalf of the CONTRACTOR.

All communications given to the superintendent shall be as binding as if given to the CONTRACTOR. The CONTRACTOR shall cooperate with the Project Manager in every way possible.

6.3 Character of Workers:

The CONTRACTOR shall provide a sufficient number of competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The CONTRACTOR shall at all times maintain good discipline and order at the site. The Project Manager may, in writing, require the CONTRACTOR to remove from the Work any employee the Project Manager deems incompetent, careless, or otherwise detrimental to the progress of the Work, but the Project Manager shall have no duty to exercise this right.

6.4 CONTRACTOR to Furnish:

Unless otherwise specified in the General Requirements, the CONTRACTOR shall furnish and assume full responsibility for all materials, equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance testing, start-up and completion of the Work.

6.5 Materials and Equipment:

All materials and equipment shall be of specified quality and new, except as otherwise provided in the Contract Documents. If required by the Project Manager, the CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to the AUTHORITY or any of the AUTHORITY's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 2.3.

6.6 Anticipated Schedules:

6.6.1 Prior to submitting the CONTRACTOR's first Application for Payment the CONTRACTOR shall submit to the Project Manager for review an anticipated progress schedule indicating the starting and completion dates of the various stages of the Work.

6.6.2 Prior to submitting the CONTRACTOR's first Application for Payment, the CONTRACTOR shall submit to the Project Manager for review:

Anticipated schedule of Shop Drawing submissions; and

Anticipated Schedule of Values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by the CONTRACTOR at the time of submission.

6.7 Finalizing Schedules:

Prior to processing the first Application for Payment the Project Manager and the CONTRACTOR will finalize schedules required by paragraph 6.6. The finalized progress schedule will be acceptable to the AUTHORITY as providing information related to the orderly progression of the Work to completion within the Contract Time; but such acceptance will neither impose on the AUTHORITY nor relieve the CONTRACTOR from full responsibility for the progress or scheduling of the Work. If accepted, the finalized schedule of Shop Drawing and other required submissions will be acknowledgment by the AUTHORITY as providing a workable arrangement for processing the submissions. If accepted, the finalized Schedule of Values will be acknowledgment by the AUTHORITY as an approximation of anticipated value of Work accomplished over the anticipated Contract Time. Receipt and acceptance of a schedule submitted by the CONTRACTOR shall not be construed to assign responsibility for performance or contingencies to the AUTHORITY or relieve the CONTRACTOR of his responsibility to adjust his forces, equipment, and work schedules as may be necessary to insure completion of the Work within prescribed Contract Time. Should the prosecution of the Work be discontinued for any reason, the CONTRACTOR shall notify the Project Manager at least 24 hours in advance of resuming operations.

6.8 Adjusting Schedules:

Upon substantial changes to the schedule or upon request the CONTRACTOR shall submit to the Project Manager for acceptance (to the extent indicated in paragraph 6.7 and the General Requirements) adjustments in the schedules to reflect the actual present and anticipated progress of the Work.

6.9 Substitutes or "Or-Equal" Items:

- 6.9.1 Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that substitution is limited or not permitted, materials or equipment of other Suppliers may be accepted by the Project Manager only if sufficient information is submitted by the CONTRACTOR which clearly demonstrates to the Project Manager that the material or equipment proposed is equivalent or equal in all aspects to that named. The procedure for review by the Project Manager will include the following as supplemented in the General Requirements.
- 6.9.2 Requests for review of substitute items of material and equipment will not be accepted by the Project Manager from anyone other than the CONTRACTOR.
- 6.9.3 If the CONTRACTOR wishes to furnish or use a substitute item of material or equipment, the CONTRACTOR shall make written application to the Project Manager for Approval thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as the specified. The application will state that the evaluation and Approval of the proposed substitute will not delay the CONTRACTOR's timely achievement of Substantial or Final Completion, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the AUTHORITY for Work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

- 6.9.4 All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the AUTHORITY in evaluating the proposed substitute. The AUTHORITY may require the CONTRACTOR to furnish at the CONTRACTOR's expense additional data about the proposed substitute. The Project Manager may reject any substitution request which the Project Manager determines is not in the best interest of the OWNER.
- 6.9.5 Substitutions shall be permitted during or after the bid period as allowed and in accordance with Document 00 02 00 - Invitation for Bids, Document 00 70 00 – General Conditions, and Document 01 60 00 – Materials and Equipment.

6.10 Substitute Means and Methods:

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Project Manager, if the CONTRACTOR submits sufficient information to allow the Project Manager to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by the Project Manager will be similar to that provided in paragraph 6.9 as applied by the Project Manager and as may be supplemented in the General Requirements.

6.11 Evaluation of Substitution:

The Project Manager will be allowed a reasonable time within which to evaluate each proposed substitute. The Project Manager will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Contracting Officer's prior written Approval which will be evidenced by either a Change Order or a Shop Drawing Approved in accordance with Sections 6.20 and 6.21. The Contracting Officer may require the CONTRACTOR to furnish at the CONTRACTOR's expense a special performance guarantee or other Surety with respect to any substitute.

6.12 Dividing the Work:

The divisions and sections of the Specifications and the identifications of any Drawings shall not control the CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.13 Subcontractors:

The CONTRACTOR may utilize the services of appropriately licensed Subcontractors on those parts of the Work which, under normal contracting practices, are performed by Subcontractors, in accordance with the following conditions:

- 6.13.1 The CONTRACTOR shall not award any Work to any Subcontractor without prior written Approval of the Contracting Officer. This Approval will not be given until the

CONTRACTOR submits to the Contracting Officer a written statement concerning the proposed award to the Subcontractor which shall contain required Equal Employment Opportunity documents, evidence of insurance whose limits are acceptable to the CONTRACTOR, and an executed copy of the subcontract. All subcontracts shall contain provisions for prompt payment, release of retainage, and interest on late payment amounts and retainage as specified in AS 36.90.210. Contracts between subcontractors, regardless of tier, must also contain these provisions.

- 6.13.2 The CONTRACTOR shall be fully responsible to the AUTHORITY for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions.
- 6.13.3 All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate written agreement between CONTRACTOR and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the AUTHORITY and contains waiver provisions as required by paragraph 13.17 and termination provisions as required by Article 14.
- 6.13.4 Nothing in the Contract Documents shall create any contractual relationship between the AUTHORITY and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of the AUTHORITY to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Regulatory Requirements. The AUTHORITY will not undertake to settle any differences between or among the CONTRACTOR, Subcontractors, or Suppliers.
- 6.13.5 The CONTRACTOR and Subcontractors shall coordinate their work and cooperate with other trades so to facilitate general progress of Work. Each trade shall afford other trades every reasonable opportunity for installation of their work and storage of materials. If cooperative work of one trade must be altered due to lack of proper supervision or failure to make proper provisions in time by another trade, such conditions shall be remedied by the CONTRACTOR with no change in Contract Price or Contract Time.
- 6.13.6 The CONTRACTOR shall include on his own payrolls any person or persons working on this Contract who are not covered by written subcontract, and shall ensure that all Subcontractors include on their payrolls all persons performing Work under the direction of the Subcontractor.

6.14 Use of Premises:

The CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project limits and approved remote storage sites and lands and areas identified in and permitted by Regulatory Requirements, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. The CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against the AUTHORITY by any such owner or occupant

because of the performance of the Work, the CONTRACTOR shall hold the AUTHORITY harmless.

6.15 Structural Loading:

The CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.16 Record Documents:

The CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Directives, Change Orders, Supplemental Agreements, and written interpretations and clarifications (issued pursuant to paragraph 3.6) in good order and annotated to show all changes made during construction. These record documents together with all Approved samples and a counterpart of all Approved Shop Drawings will be available to the Project Manager for reference and copying. Upon completion of the Work, the annotated record documents, samples and Shop Drawings will be delivered to the Project Manager. Record documents shall accurately record variations in the Work which vary from requirements shown or indicated in the Contract Documents.

6.17 Safety and Protection:

The CONTRACTOR alone shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

- 6.17.1 All employees on the Work and other persons and organizations who may be affected thereby;
- 6.17.2 All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- 6.17.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

The CONTRACTOR shall comply with all applicable Regulatory Requirements of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The CONTRACTOR shall notify owners of adjacent property and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the CONTRACTOR with no change in Contract Price or Contract Time except as stated in 4.6, except damage or loss attributable to unforeseeable causes beyond the control of and without the fault or negligence of the CONTRACTOR, including but not restricted to acts of God, of the public enemy or governmental authorities. The CONTRACTOR's duties and responsibilities for the

safety and protection of the Work shall continue until Final Acceptance (except as otherwise expressly provided in connection with Substantial Completion).

6.18 Safety Representative:

The CONTRACTOR shall designate a responsible safety representative at the site. This person shall be the CONTRACTOR's superintendent unless otherwise designated in writing by the CONTRACTOR to the Project Manager.

6.19 Emergencies:

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the AUTHORITY, is obligated to act to prevent threatened damage, injury or loss. The CONTRACTOR shall give the Project Manager prompt written notice if the CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the AUTHORITY determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a change will be authorized by one of the methods indicated in Paragraph 9.2, as determined appropriate by the Project Manager.

6.20 Shop Drawings and Samples:

- 6.20.1 After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, the CONTRACTOR shall submit to the Project Manager for review and Approval in accordance with the accepted schedule of Shop Drawing submissions the required number of all Shop Drawings, which will bear a stamp or specific written indication that the CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as the Project Manager may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable the Project Manager to review the information as required.
- 6.20.2 The CONTRACTOR shall also submit to the Project Manager for review and Approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that the CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.
- 6.20.3 Before submission of each Shop Drawing or sample the CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.
- 6.20.4 At the time of each submission the CONTRACTOR shall give the Project Manager specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a

specific notation to be made on each Shop Drawing submitted to the Project Manager for review and Approval of each such variation. All variations of the proposed Shop Drawing from that specified will be identified in the submission and available maintenance, repair and replacement service will be indicated. The submittal will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such variation, including costs of redesign and claims of other Contractors affected by the resulting change, all of which shall be considered by the AUTHORITY in evaluating the proposed variation. If the variation may result in a change of Contract Time or Price, or Contract responsibility, and is not minor in nature; the CONTRACTOR must submit a written request for Change Order with the variation to notify the AUTHORITY of his intent. The AUTHORITY may require the CONTRACTOR to furnish at the CONTRACTOR's expense additional data about the proposed variation. The Project Manager may reject any variation request which the Project Manager determines is not in the best interest of the AUTHORITY.

6.21 Shop Drawing and Sample Review:

- 6.21.1 The Project Manager will review with reasonable promptness Shop Drawings and samples, but the Project Manager's review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate acceptance of the assembly in which the item functions. The CONTRACTOR shall make corrections required by the Project Manager and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review. The CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by the Project Manager on previous submittals.
- 6.21.2 The Project Manager's review of Shop Drawings or samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless the CONTRACTOR has in writing advised the Project Manager of each such variation at the time of submission as required by paragraph 6.20.4. The Contracting Officer if he so determines, may give written Approval of each such variation by Change Order, except that, if the variation is minor and no Change Order has been requested a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample review comments shall suffice as a modification. Approval by the Contracting Officer will not relieve the CONTRACTOR from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 6.20.3.
- 6.21.3 The AUTHORITY shall be responsible for all AUTHORITY review costs resulting from the initial submission and the resubmittal. The CONTRACTOR shall, at the discretion of the AUTHORITY, pay all review costs incurred by the AUTHORITY as a result of any additional re-submittals.
- 6.21.4 Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to the Project Manager's review and Approval of the pertinent submission will be the sole expense and responsibility of the CONTRACTOR.

6.22 Maintenance During Construction:

The CONTRACTOR shall maintain the Work during construction and until Substantial Completion, at which time the responsibility for maintenance shall be established in accordance with paragraph 13.10.

6.23 Continuing the Work:

The CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with the AUTHORITY. No Work shall be delayed or postponed pending resolution of any disputes, disagreements, or claims except as the CONTRACTOR and the Contracting Officer may otherwise agree in writing.

6.24 Consent to Assignment:

The CONTRACTOR shall obtain the prior written consent of the Contracting Officer to any proposed assignment of any interest in, or part of this Contract. The consent to any assignment or transfer shall not operate to relieve the CONTRACTOR or his Sureties of any of his or its obligations under this Contract or the Performance Bonds. Nothing herein contained shall be construed to hinder, prevent, or affect an assignment of monies due, or to become due hereunder, made for the benefit of the CONTRACTOR's creditors pursuant to law.

6.25 Use of Explosives:

- 6.25.1 When the use of explosives is necessary for the prosecution of the Work, the CONTRACTOR shall exercise the utmost care not to endanger life or property, including new Work and shall follow all Regulatory Requirements applicable to the use of explosives. The CONTRACTOR shall be responsible for all damage resulting from the use of explosives.
- 6.25.2 All explosives shall be stored in a secure manner in compliance with all Regulatory Requirements, and all such storage places shall be clearly marked. Where no Regulatory Requirements apply, safe storage shall be provided not closer than 1,000 feet from any building, camping area, or place of human occupancy.
- 6.25.3 The CONTRACTOR shall notify each public utility owner having structures in proximity to the site of his intention to use explosives. Such notice shall be given sufficiently in advance to enable utility owners to take such steps as they may deem necessary to protect their property from injury. However, the CONTRACTOR shall be responsible for all damage resulting from the use of the explosives, whether or not, utility owners act to protect their property.

6.26 CONTRACTOR's Records:

- 6.26.1 Records of the CONTRACTOR and Subcontractors relating to personnel, payrolls, invoices of materials, and any and all other data relevant to the performance of this Contract, must be kept on a generally recognized accounting system. Such records must be available during normal work hours to the Contracting Officer for purposes of investigation to ascertain compliance with Regulatory Requirements and provisions of the Contract Documents.
- 6.26.2 Payroll records must contain the name and address of each employee, his correct classification, rate of pay, daily and weekly number of hours of work, deductions made,

and actual wages paid. The CONTRACTOR and Subcontractors shall make employment records available for inspection by the Contracting Officer and representatives of the U.S. and/or State Department of Labor and will permit such representatives to interview employees during working hours on the Project.

- 6.26.3 Records of all communications between the AUTHORITY and the CONTRACTOR and other parties, where such communications affected performance of this Contract, must be kept by the CONTRACTOR and maintained for a period of three years from Final Acceptance. The AUTHORITY or its assigned representative may perform an audit of these records during normal work hours after written notice to the CONTRACTOR.

6.27 Load Restrictions

The CONTRACTOR shall comply with all load restrictions as set forth in the "Administrative Permit Manual", and Title 17, Chapter 25, of the Alaska Administrative Code in the hauling of materials on public roads, beyond the limits of the project, and on all public roads within the project limits that are scheduled to remain in use upon completion of the project.

Overload permits may, at the discretion of the State, be issued for travel beyond the project limits for purposes of mobilization and/or demobilization. Issuance of such a permit will not relieve the CONTRACTOR of liability for damage which may result from the moving of equipment.

The operation of equipment of such weight or so loaded as to cause damage to any type of construction will not be permitted. No overloads will be permitted on the base course or surface course under construction. No loads will be permitted on a concrete pavement, base or structure before the expiration of the curing period. The CONTRACTOR shall be responsible for all damage done by his equipment.

ARTICLE 7 - LAWS AND REGULATIONS

7.1 Laws to be Observed

The CONTRACTOR shall keep fully informed of all federal and state Regulatory Requirements and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the Work, or which in any way affect the conduct of the Work. The CONTRACTOR shall at all times observe and comply with all such Regulatory Requirements, orders and decrees; and shall protect and indemnify the AUTHORITY and its representatives against claim or liability arising from or based on the violation of any such Regulatory Requirement, order, or decree whether by the CONTRACTOR, Subcontractor, or any employee of either. Except where otherwise expressly required by applicable Regulatory Requirements, the AUTHORITY shall not be responsible for monitoring CONTRACTOR's compliance with any Regulatory Requirements.

7.2 Permits, Licenses, and Taxes

- 7.2.1 The CONTRACTOR shall procure all permits and licenses, pay all charges, fees and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work. As a condition of performance of this Contract, the CONTRACTOR shall pay all federal, state and local taxes incurred by the CONTRACTOR, in the performance of

this Contract. Proof of payment of these taxes is a condition precedent to final payment by the AUTHORITY under this Contract.

7.2.2 The CONTRACTOR's certification that taxes have been paid (as contained in the *Release of Contract*) will be verified with the Department of Revenue and Department of Labor, prior to final payment.

7.2.3 If any federal, state or local tax is imposed, charged, or repealed after the date of bid opening and is made applicable to and paid by the CONTRACTOR on the articles or supplies herein contracted for, then the Contract shall be increased or decreased accordingly by a Change Order.

7.3 Patented Devices, Materials and Processes

If the CONTRACTOR employs any design, device, material, or process covered by letters of patent, trademark or copyright, the CONTRACTOR shall provide for such use by suitable legal agreement with the patentee or owner. The CONTRACTOR and the Surety shall indemnify and save harmless the AUTHORITY, any affected third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the AUTHORITY for any costs, expenses, and damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the Work.

7.4 Compliance of Specifications and Drawings:

If the CONTRACTOR observes that the Specifications and Drawings supplied by the AUTHORITY are at variance with any Regulatory Requirements, CONTRACTOR shall give the Project Manager prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 9.2. as determined appropriate by the Project Manager. If the CONTRACTOR performs any Work knowing or having reason to know that it is contrary to such Regulatory Requirements, and without such notice to the Project Manager, the CONTRACTOR shall bear all costs arising there from; however, it shall not be the CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings supplied by the AUTHORITY are in accordance with such Regulatory Requirements.

7.5 Accident Prevention:

The CONTRACTOR shall comply with AS 18.60.075 and all pertinent provisions of the Construction Code Occupational Safety and Health Standards issued by the Alaska Department of Labor.

7.6 Sanitary Provisions:

The CONTRACTOR shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees and AUTHORITY representatives as may be necessary to comply with the requirements of the State and local Boards of Health, or of other bodies or tribunals having jurisdiction.

7.7 Business Registration:

Comply with AS 08.18.011, as follows: "it is unlawful for a person to submit a bid or work as a contractor until he has been issued a certificate of registration by the Department of Commerce. A partnership or joint venture shall be considered registered if one of the general partners or ventures whose name appears in the name under which the partnership or venture does business is registered."

7.8 Professional Registration and Certification:

All craft trades, architects, engineers and land surveyors, electrical administrators, and explosive handlers employed under the Contract shall specifically comply with applicable provisions of AS 08.18, 08.48, 08.40, and 08.52. Provide copies of individual licenses within seven days following a request from the Contracting Officer.

7.9 Local Building Codes:

The CONTRACTOR shall comply with AS 35.10.025 which requires construction in accordance with applicable local building codes to include the obtaining of required permits.

7.10 Air Quality Control:

The CONTRACTOR shall comply with all applicable provisions of AS 46.03.04 as pertains to Air Pollution Control.

7.11 Archaeological or Paleontological Discoveries:

When the CONTRACTOR's operation encounters prehistoric artifacts, burials, remains of dwelling sites, or paleontological remains, such as shell heaps, land or sea mammal bones or tusks, the CONTRACTOR shall cease operations immediately and notify the Project Manager. No artifacts or specimens shall be further disturbed or removed from the ground and no further operations shall be performed at the site until so directed. Should the Contracting Officer order suspension of the CONTRACTOR's operations in order to protect an archaeological or historical finding, or order the CONTRACTOR to perform extra Work, such shall be covered by an appropriate Contract change document.

7.12 Applicable Alaska Preferences: Not Applicable.

7.13 Preferential Employment: Not Applicable.

7.14 Wages and Hours of Labor:

7.14.1 One certified copy of all payrolls shall be submitted weekly to the State Department of Labor and, upon request, to the Contracting Officer to assure to assure compliance with AS 36.05.040, *Filing Schedule of Employees Wages Paid and Other Information*. The CONTRACTOR shall be responsible for the submission of certified copies of payrolls of all Subcontractors. The certification shall affirm that the payrolls are current and complete, that the wage rates contained therein are not less than the applicable rates referenced in these Contract Documents, and that the classification set forth for each laborer or mechanic conforms to the Work performed. The CONTRACTOR and his Subcontractors shall attend all hearings and conferences and produce such books, papers, and documents all as requested by the Department of Labor. Should federal funds be involved, the appropriate federal agency shall also receive a copy of the CONTRACTOR's certified payrolls. Regardless of project funding source, copies of all certified payrolls supplied to the State Department of Labor by the CONTRACTOR shall

be supplied also to the Project Manager upon request, including submittals made by, or on behalf of, subcontractors.

7.14.2 The following labor provisions shall also apply to this Contract:

- a. The CONTRACTOR and his Subcontractors shall pay all employees unconditionally and not less than once a week;
- b. wages may not be less than those stated under AS 36.05.010, regardless of the contractual relationship between the CONTRACTOR or Subcontractors and laborers, mechanics, or field surveyors;
- c. 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;
- d. the AUTHORITY 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
 1. the rates of wages required by the Contract to be paid laborers, mechanics, or field surveyors on the Work, and
 2. the rates of wages in fact received by laborers, mechanics or field surveyors.

7.14.3 Within three calendar days of award of a construction contract, the CONTRACTOR shall file a "Notice of Work" with the Department of Labor and shall pay all related fees. The Contracting Officer will not issue Notice to Proceed to the CONTRACTOR until such notice and fees have been paid to the Department of Labor. Failure of the CONTRACTOR to file the Notice of Work and pay fees within this timeframe shall not constitute grounds for an extension of contract time or adjustment of contract price.

7.15 Overtime Work Hours and Compensation:

Pursuant to 40 U.S.C. 327-330 and AS 23.10.060 -.110, the CONTRACTOR shall not require nor permit any laborer or mechanic in any workweek in which he is employed on any Work under this Contract to work in excess of eight hours in any Calendar Day or in excess of forty hours in such workweek on Work subject to the provisions of the *Contract Work Hours and Safety Standards Act* unless such laborer or mechanic receives compensation at a rate not less than one and one half times his basic rate of pay for all such hours worked in excess of eight hours in any Calendar Day or in excess of forty hours in such workweek whichever is the greater number of overtime hours. In the event of any violation of this provision, the CONTRACTOR shall be liable to any affected employee for any amounts due and penalties and to the AUTHORITY for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of this provision in the sum of \$10.00 for each Calendar Day on which such employee was required or permitted to be employed on such Work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by this paragraph.

7.16 Covenant Against Contingent Fees:

The CONTRACTOR warrants that no person or selling agent has been employed or retained to solicit or secure this Contract upon an agreement or understanding for a

commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the CONTRACTOR for the purpose of securing business. For breach or violation of this warrant, the DEPARTMENT shall have the right to annul this Contract without liability or, in its discretion, to deduct price of consideration from the Contract or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

7.17 Officials Not to Benefit:

No member of or delegate to the U.S. Congress, the Alaska State Legislature or other state official shall be admitted to any share or part of this Contract, nor to any benefit that may arise there from. However, this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

7.18 Personal Liability of Public Officials:

In carrying out any of the provisions thereof, or in exercising any power or authority granted to the Contracting Officer by the Contract, there will be no liability upon the Contracting Officer nor upon AUTHORITY employees authorized as his representatives, either personally or as officials of the AUTHORITY, it being always understood that in such matters they act as agents and representatives of the AUTHORITY.

ARTICLE 8 - OTHER WORK

8.1 Related Work at Site:

8.1.1 The AUTHORITY reserves the right at any time to contract for and perform other or additional work on or near the Work covered by the Contract.

8.1.2 When separate contracts are let within the limits of the Project, the CONTRACTOR shall conduct his Work so as not to interfere with or hinder the work being performed by other contractors. The CONTRACTOR when working on the same Project with other contractors shall cooperate with such other contractors. The CONTRACTOR shall join his Work with that of the others in an acceptable manner and shall perform it in proper sequence to that of others.

8.1.3 If the fact that other such work is to be performed is identified or shown in the Contract Documents the CONTRACTOR shall assume all liability, financial or otherwise, in connection with this Contract and indemnify and save harmless the AUTHORITY from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by the CONTRACTOR because of the presence and operations of other contractors.

8.1.4 If the fact that such other work is to be performed was not identified or shown in the Contract Documents, written notice thereof will be given to the CONTRACTOR prior to starting any such other work. If the CONTRACTOR believes that such performance will require an increase in Contract Price or Contract Time, the CONTRACTOR shall notify the Project Manager of such required increase within fifteen (15) calendar days following receipt of the Contracting Officer's notice. Should the Project Manager find such increase(s) to be justified, a Change Order will be executed.

8.2 Access, Cutting, and Patching:

The CONTRACTOR shall afford each utility owner and any other contractor who is a party to such a direct contract with the AUTHORITY (or the AUTHORITY, if the AUTHORITY is performing the additional work with the AUTHORITY's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with the work of others. The CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work, the CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter such other work with the written consent of the Project Manager. The duties and responsibilities of the CONTRACTOR under this paragraph are for the benefit of other contractors to the extent that there are comparable provisions for the benefit of the CONTRACTOR in said direct contracts between the AUTHORITY and other contractors.

8.3 Defective Work by Others:

If any part of the CONTRACTOR's Work depends for proper execution or results upon the work of any such other contractor, utility owner, or the AUTHORITY, the CONTRACTOR shall inspect and promptly report to the Project Manager in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. The CONTRACTOR's failure to so report will constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR's Work except for latent or non-apparent defects and deficiencies in the other work.

8.4 Coordination:

If the AUTHORITY contracts with others for the performance of other work at the site, Project Manager will have authority and responsibility for coordination of the activities among the various prime contractors.

ARTICLE 9 - CHANGES

9.1 AUTHORITY's Right to Change

Without invalidating the Contract and without notice to any Surety, the AUTHORITY may, at any time or from time to time, order additions, deletions or revisions in the Work within the general scope of the Contract, including but not limited to changes:

- 9.1.1 In the Contract Documents;
- 9.1.2 In the method or manner of performance of the Work;
- 9.1.3 In Authority-furnished facilities, equipment, materials, services, or site;
- 9.1.4 Directing acceleration in the performance of the Work.

9.2 Authorization of Changes within the General Scope.

Additions, deletions, or revisions in the Work within the general scope of the Contract as specified in 9.1 shall be authorized by one or more of following ways:

- 9.2.1 Directive (pursuant to paragraph 9.3)

9.2.2 A Change Order (pursuant to paragraph 9.4)

9.2.3 AUTHORITY's acceptance of Shop Drawing variations from the Contract Documents as specifically identified by the CONTRACTOR as required by paragraph 6.20.4.

9.3 Directive

9.3.1 The Contracting Officer shall provide written clarification or interpretation of the Contract Documents (pursuant to paragraph 3.6).

9.3.2 The Project Manager may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents.

9.3.3 The Project Manager may order the Contractor to correct Defective Work or methods which are not in conformance with the Contract Documents.

9.3.4 The Project Manager may direct the commencement or suspension of Work or emergency related Work (as provided in paragraph 6.19).

9.3.5 Upon the issuance of a Directive to the CONTRACTOR by the Project Manager, the CONTRACTOR shall proceed with the performance of the Work as prescribed by such Directive.

9.3.6 If the CONTRACTOR believes that the changes noted in a Directive may cause an increase in the Contract Price or an extension of Contract Time, the CONTRACTOR shall immediately provide written notice to the Project Manager depicting such increases before proceeding with the Directive, except in the case of an emergency. If the Project Manager finds the increase in Contract Price or the extension of Contract Time justified, a Change Order will be issued. If however, the Project Manager does not find that a Change Order is justified, the Project Manager may direct the CONTRACTOR to proceed with the Work. The CONTRACTOR shall cooperate with the Project Manager in keeping complete daily records of the cost of such Work. If a Change Order is ultimately determined to be justified, in the absence of agreed prices and unit prices, payment for such Work will be made on a "cost of the work basis" as provided in 10.4

9.4 Change Order

A change in Contract Time, Contract Price, or responsibility may be made for changes within the scope of the Work by Change Order. Upon receipt of an executed Change Order, the CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents except as otherwise specifically provided. Changes in Contract Price and Contract Time shall be made in accordance with Articles 10 and 11. A Change Order shall be considered executed when it is signed by the AUTHORITY.

9.5 Shop Drawing Variations

Variations by shop drawings shall only be eligible for consideration under 9.4 when the conditions affecting the price, time, or responsibility are identified by the CONTRACTOR in writing and a request for a Change Order is submitted as per 6.20.4.

9.6 Changes Outside the General Scope; Supplemental Agreement

Any change which is outside the general scope of the Contract, as determined by the Project Manager, must be authorized by a Supplemental Agreement signed by the appropriate representatives of the AUTHORITY and the CONTRACTOR.

9.7 Unauthorized Work:

The CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in this Article 9, except in the case of an emergency as provided in paragraph 6.19 and except in the case of uncovering Work as provided in paragraph 12.4.2.

9.8 Notification of Surety:

If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any bond to be given to a Surety, the giving of any such notice will be the CONTRACTOR's responsibility, and the amount of each applicable bond will be adjusted accordingly.

9.9 Differing Site Conditions:

9.9.1 The CONTRACTOR shall promptly, and before such conditions are disturbed (except in an emergency as permitted by paragraph 6.19), notify the Project Manager in writing of: (1) subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, and which could not have been discovered by a careful examination of the site, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract. The Project Manager shall promptly investigate the conditions, and if the Project Manager finds that such conditions do materially so differ and cause an increase or decrease in the CONTRACTOR's cost of, or time required for, performance of this Contract, an equitable adjustment shall be made and the Contract modified in writing accordingly.

9.9.2 Any claim for additional compensation by the CONTRACTOR under this clause shall be made in accordance with Article 15. In the event that the Contracting Officer and the CONTRACTOR are unable to reach an agreement concerning an alleged differing site condition, the CONTRACTOR will be required to keep an accurate and detailed record which will indicate the actual "cost of the work" done under the alleged differing site condition. Failure to keep such a record shall be a bar to any recovery by reason of such alleged differing site conditions. The Project Manager shall be given the opportunity to supervise and check the keeping of such records.

9.10 Interim Work Authorization

An Interim Work Authorization may be used to establish a change within the scope of the Work; however, only a Change Order shall establish associated changes in Contract Time and Price. Work authorized by Interim Work Authorization shall be converted to a Change Order. The basis of payment shall be as stated in the Interim Work

Authorization, unless it states that the basis of payment has not been established and is to be negotiated, in which case the Cost of the Work shall be documented pursuant to Article 10.4, to establish a basis for negotiating a lump sum price for the Change Order.

ARTICLE 10 - CONTRACT PRICE; COMPUTATION AND CHANGE

10.1 Contract Price:

The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to the CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the CONTRACTOR shall be at his expense without change in the Contract Price. The Contract Price may only be changed by a Change Order or Supplemental Agreement.

10.2 Claim for Price Change:

Any claim for an increase or decrease in the Contract Price shall be submitted in accordance with the terms of Article 15, and shall not be allowed unless notice requirements of this Contract have been met.

10.3 Change Order Price Determination:

The value of any Work covered by a Change Order for an increase or decrease in the Contract Price shall be determined in one of the following ways:

- 10.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of subparagraphs 10.9.1 through 10.9.3, inclusive).
- 10.3.2 By mutual acceptance of a lump sum price that 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. 17% - 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 17%. 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%.

- 10.3.3 When 10.3.1 and 10.3.2 are inapplicable, on the basis of the "cost of the work" (determined as provided in paragraphs 10.4 and 10.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 10.6).
- 10.3.4 Before a Change Order or Supplemental Agreement is approved, the CONTRACTOR shall submit cost or pricing data regarding the changed or extra Work. The CONTRACTOR shall certify that the data submitted is, to his best knowledge and belief, accurate, complete and current as of a mutually determined specified date and that such data will continue to be accurate and complete during the performance of the changed or extra Work.

10.4 Cost of the Work:

The term "cost of the work" means the sum of all costs necessarily incurred and paid by the CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by the AUTHORITY, such costs shall be in amount no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in subparagraph 10.5:

- 10.4.1 Payroll costs for employees in the direct employ of the CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by the AUTHORITY and the CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise

and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include manual workers up through the level of foreman but shall not include general foremen, superintendents, and non-manual employees. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays shall be included in the above to the extent authorized by the AUTHORITY.

- 10.4.2 Cost of all materials and equipment furnished and incorporated or consumed in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to the CONTRACTOR unless the AUTHORITY deposits funds with the CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to the AUTHORITY. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the AUTHORITY, and the CONTRACTOR shall make provisions so that they may be obtained.
- 10.4.3 Payments made by the CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by the AUTHORITY, CONTRACTOR shall obtain competitive quotes from Subcontractors or Suppliers acceptable to the CONTRACTOR and shall deliver such quotes to the AUTHORITY who will then determine which quotes will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of "cost of the work" plus a fee, the Subcontractor' "cost of the work" shall be determined in the same manner as the CONTRACTOR's "cost of work" as described in paragraphs 10.4 through 10.5; and the Subcontractor's fee shall be established as provided for under subparagraph 10.6.2 clause b. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.
- 10.4.4 Costs of special consultants (including but not limited to engineers, architects, testing laboratories, and surveyors) employed for services necessary for the completion of the Work.
- 10.4.5 Supplemental costs including the following:
- a. The proportion of necessary transportation, travel and subsistence expenses of the CONTRACTOR's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of the CONTRACTOR.
 - c. Rentals of all construction equipment and machinery and the parts thereof whether rented from the CONTRACTOR or others in accordance with rental agreements Approved by the AUTHORITY and the costs of transportation, loading, unloading, installation, dismantling and removal thereof - all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

For any machinery or special equipment (other than small tools) which has been authorized by the Project Manager, the CONTRACTOR shall receive the rental rates in the current edition and appropriate volume of the "Rental Rate Blue Book for Construction Equipment", published by Dataquest, Inc., 1290 Ridder Park Drive, San Jose, CA 95131.

Hourly rental rates shall be determined as follows:

The established hourly rental rate shall be equal to the adjusted monthly rate for the basic equipment plus the adjusted monthly rate for applicable attachments, both divided by 176, and multiplied by the area adjustment factor, plus the estimated hourly operating cost.

The adjusted monthly rate is that resulting from application of the rate adjustment formula in order to eliminate replacement cost allowances in machine depreciation and contingency cost allowances.

Attachments shall not be included unless required for the time and materials work.

For equipment not listed in The Blue Book, the CONTRACTOR shall receive a rental rate as agreed upon before such work is begun. If agreement cannot be reached, the AUTHORITY reserves the right to establish a rate based on similar equipment in the Blue Book or prevailing commercial rates in the area.

These rates shall apply for equipment used during the CONTRACTOR's regular shift of 10 hours per day. Where the equipment is used more than 10 hours per day, either on the CONTRACTOR's normal work or on time and materials, and either on single or multiple shifts, an overtime rate, computed as follows, shall apply:

The hourly overtime rate shall be equal to the adjusted monthly rate for the basic equipment plus the adjusted monthly rate for applicable attachments, both divided by 352, and multiplied by the area adjustment factor, plus the estimated hourly operating cost.

Equipment which must be rented or leased specifically for work required under this section shall be authorized in writing by the Project Manager. The CONTRACTOR shall be paid invoice price plus 15%.

When it is necessary to obtain equipment from sources beyond the project limits exclusively for time and materials, work, the actual cost of transferring the equipment to the site of the work and return will be allowed as an additional item of expense. Where the move is made by common carrier, the move-in allowance will be limited to the amount of the freight bill or invoice. If the CONTRACTOR hauls the equipment with his own forces, the allowance will be limited to the rental rate for the hauling unit plus operator wages. In the event that the equipment is transferred under its own power, the moving allowance will be limited to one-half of the normal hourly rental rate plus operator's wages. In the event that the move-out is to a different location, payment will in no instance exceed the amount of the move-in. Move-in allowance shall not be made for equipment brought to the project for time and materials work which is subsequently retained on the project and utilized for completion of contract items, camp maintenance, or related work.

Equipment ordered to be on a stand-by basis shall be paid for at the stand-by rental rate for the number of hours in the CONTRACTOR'S normal work shift, but not to exceed 8 hours per day. The stand-by rental rate shall be computed as follows:

The hourly stand-by rate shall be equal to the adjusted monthly rate for the basic equipment plus the adjusted monthly rate for applicable attachments, both divided by

352, all multiplied by the area adjustment factor.

Time will be recorded to the nearest one-quarter hour for purposes of computing compensation to the CONTRACTOR for equipment utilized under these rates.

The equipment rates as determined above shall be full compensation, including overhead and profit, for providing the required equipment and no additional compensation will be made for other costs such as, but not limited to, fuels, lubricants, replacement parts or maintenance costs. Cost of repairs, both major and minor, as well as charges for mechanic's time utilized in servicing equipment to ready it for use prior to moving to the project and similar charges will not be allowed.

- d. Sales, consumer, use or similar taxes related to the Work, and for which the CONTRACTOR is liable, imposed by Regulatory Requirements.
- e. Deposits lost for causes other than negligence of the CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by the CONTRACTOR in connection with the performance and furnishing of the Work provided they have resulted from causes other than the negligence of the CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and Approval of the AUTHORITY. No such losses, damages and expenses shall be included in the "cost of the work" for the purpose of determining the CONTRACTOR's fee. If, however, any such loss or damage requires reconstruction and the CONTRACTOR is placed in charge thereof, the CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraphs 10.6.2.a and 10.6.2.b.
- g. The cost of utilities, fuel and sanitary facilities at the site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.
- i. Cost of premiums for additional bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by the AUTHORITY in accordance with Article 5.

10.5 Excluded Costs:

The term "cost of the work" shall not include any of the following:

- 10.5.1 Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing agency, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 10.4.1 or specifically covered by paragraph 10.4.4 all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

- 10.5.2 Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.
- 10.5.3 Any part of CONTRACTOR's capital expenses including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.
- 10.5.4 Cost of premiums for all bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 10.4.5.i above).
- 10.5.5 Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of Defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.
- 10.5.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 10.4.

10.6 CONTRACTOR's Fee:

The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows.

- 10.6.1 A mutually acceptable fixed fee; or if none can be agreed upon.
- 10.6.2 A fee based on the following percentages of the various portions of the "cost of the work":
 - a. For costs incurred under paragraphs 10.4.1 and 10.4.2, the CONTRACTOR's fee shall be twenty percent;
 - b. For costs incurred under paragraph 10.4.3, the CONTRACTOR's fee shall be ten percent; and if a subcontract is on the basis of "cost of the work" plus a fee, the maximum allowable to CONTRACTOR on account of overhead and profit of all Subcontractors and multiple tiers thereof shall be fifteen percent;
 - c. No fee shall be payable on the basis of costs itemized under paragraphs 10.4.4, 10.4.5 and 10.5;
 - d. The amount of credit to be allowed by the CONTRACTOR to the AUTHORITY for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in CONTRACTOR's fee by an amount equal to ten percent of the net decrease; and
 - e. When both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 10.6.2.a through 10.6.2.d, inclusive.

10.7 Cost Breakdown:

Whenever the cost of any Work is to be determined pursuant to paragraphs 10.4 and 10.5, the CONTRACTOR will submit in a form acceptable to the AUTHORITY an itemized cost breakdown together with supporting data.

10.8 Cash Allowances:

It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to the Contracting Officer. CONTRACTOR agrees that:

- 10.8.1 The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and
- 10.8.2 CONTRACTOR's cost for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

Prior to final payment, an appropriate Change Order will be issued to reflect actual amounts due the CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

10.9 Unit Price Work:

- 10.9.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by the CONTRACTOR will be made by the AUTHORITY in accordance with paragraph 10.10.
- 10.9.2 Each unit price will be deemed to include an amount considered by the CONTRACTOR to be adequate to cover the CONTRACTOR's overhead and profit for each separately identified item. If the "Basis of Payment" clause in the Contract Documents relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Contract Documents.
- 10.9.3 Payment to the CONTRACTOR shall be made only for the actual quantities of Work performed and accepted or materials furnished, in conformance with the Contract Documents. When the accepted quantities of Work or materials vary from the quantities stated in the bid schedule, or change documents, the CONTRACTOR shall accept as

payment in full, payment at the stated unit prices for the accepted quantities of Work and materials furnished, completed and accepted; except as provided below:

- a. When the quantity of Work to be done or material to be furnished under any item, for which the total cost of the item exceeds 10% of the total Contract Price, is increased by more than 25 percent of the quantity stated in the bid schedule, or change documents, either party to the Contract, upon demand, shall be entitled to an equitable unit price adjustment on that portion of the Work above 125 percent of the quantity stated in the bid schedule.
- b. When the quantity of Work to be done or material to be furnished under any major item, for which the total cost of the item exceeds 10% of the total Contract Price, is decreased by more than 25 percent of the quantity stated in the bid schedule, or change documents either party to the Contract, upon demand, shall be entitled to an equitable price adjustment for the quantity of Work performed or material furnished, limited to a total payment of not more than 75 percent of the amount originally bid for the item.

10.10 Determinations for Unit Prices:

The Project Manager will determine the actual quantities and classifications of Unit Price Work performed by the CONTRACTOR. The Project Manager will review with the CONTRACTOR preliminary determinations on such matters before finalizing the costs and quantities on the Schedule of Values. The Project Manager's acknowledgment thereof will be final and binding on the CONTRACTOR, unless, within 10 days after the date of any such decisions, the CONTRACTOR delivers to the Project Manager written notice of intention to appeal from such a decision.

ARTICLE 11 - CONTRACT TIME; COMPUTATION AND CHANGE

11.1 Commencement of Contract Time; Notice to Proceed:

The Contract Time will commence to run on the day indicated in the Notice to Proceed.

11.2 Starting the Work:

No Work on Contract items shall be performed before the effective date of the Notice to Proceed. The CONTRACTOR shall notify the Project Manager at least 24 hours in advance of the time actual construction operations will begin. The CONTRACTOR may request a limited Notice to Proceed after Award has been made, to permit him to order long lead materials which could cause delays in Project completion. However, granting is within the sole discretion of the Contracting Officer, and refusal or failure to grant a limited Notice to Proceed shall not be a basis for claiming for delay, extension of time, or alteration of price.

11.3 Computation of Contract Time:

- 11.3.1 When the Contract Time is specified on a Calendar Day basis, all Work under the Contract shall be completed within the number of Calendar Days specified. The count of Contract Time begins on the day following receipt of the Notice to Proceed by the CONTRACTOR, if no starting day is stipulated therein.

Calendar Days shall continue to be counted against Contract Time until and including the date of Substantial Completion of the Work.

11.3.2 When the Contract completion time is specified as a fixed calendar date, it shall be the date of Final Completion.

11.3.3 The Contract Time shall be as stated is 00800, Supplementary Conditions.

11.4 Time Change:

The Contract Time may only be changed by a Change Order or Supplemental Agreement.

11.5 Extension Due to Delays:

The right of the CONTRACTOR to proceed shall not be terminated nor the CONTRACTOR charged with liquidated or actual damages because of delays to the completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including, but not restricted to the following: acts of God or of the public enemy, acts of the AUTHORITY in its contractual capacity, acts of another contractor in the performance of a contract with the AUTHORITY, floods, fires, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather and delays of Subcontractors or Suppliers due to such causes. Any delay in receipt of materials on the site, caused by other than one of the specifically mentioned occurrences above, does not of itself justify a time extension, provided that the CONTRACTOR shall within twenty four (24) hours from the beginning of any such delay (unless the Contracting Officer shall grant a further period of the time prior to the date of final settlement of the Contract), notify the Project Manager in writing of the cause of delay. The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the Work when the findings of fact justify such an extension.

11.6 Essence of Contract:

All time limits stated in the Contract Documents are of the essence of the Contract.

11.7 Reasonable Completion Time:

It is expressly understood and agreed by and between the CONTRACTOR and the AUTHORITY that the date of beginning and the time for Substantial Completion of the Work described herein are reasonable times for the completion of the Work.

11.8 Delay Damages:

Whether or not the CONTRACTOR's right to proceed with the Work is terminated, he and his Sureties shall be liable for damages resulting from his refusal or failure to complete the Work within the specified time.

Liquidated and actual damages for delay shall be paid by the CONTRACTOR or his Surety to the AUTHORITY in the amount as specified in the Supplementary Conditions for each Calendar Day the completion of the Work or any part thereof is delayed beyond the time required by the Contract, or any extension thereof. If a listing of incidents resulting from a delay and expected to give rise to actual or liquidated damages is not established by the Contract Documents, then the CONTRACTOR and his Surety shall be liable to the AUTHORITY for any actual damages occasioned by such delay. The CONTRACTOR acknowledges that the liquidated damages established herein are not a penalty but rather constitute an estimate of damages that the AUTHORITY will sustain by reason of delayed completion. These liquidated and actual damages are intended as compensation for losses anticipated arising, and including those items enumerated in the Supplementary Conditions.

These damages will continue to run both before and after termination in the event of default termination. These liquidated damages do not cover excess costs of completion or AUTHORITY costs, fees, and charges related to reprocurement. If a default termination occurs, the CONTRACTOR or his Surety shall pay in addition to these damages, all excess costs and expenses related to completion as provided by Article 14.2.5.

For each calendar day that the work remains incomplete after the expiration of the Contract Time, liquidated damages in the amount as stated in 00800, Supplemental Conditions shall be assessed to the CONTRACTOR. If no money is due the CONTRACTOR, the AUTHORITY shall have the right to recover said sum from the CONTRACTOR, the surety or both. The amount of these deductions is to reimburse the AUTHORITY for estimated liquidated damages incurred as a result of the CONTRACTOR's failure to complete the work within the time specified. As liquidated damages, such deductions are not to be considered as penalties.

Permitting the CONTRACTOR to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the AUTHORITY of any of its rights under the Contract.

ARTICLE 12 - QUALITY ASSURANCE

12.1 Warranty and Guaranty:

The CONTRACTOR warrants and guarantees to the AUTHORITY that all Work will be in accordance with the Contract Documents and will not be Defective. Prompt notice of all defects shall be given to the CONTRACTOR. All Defective Work, whether or not in place, may be rejected, corrected or accepted as provided for in this article.

12.2 Access to Work:

The AUTHORITY and the AUTHORITY's consultants, testing agencies and governmental agencies with jurisdiction interests will have access to the Work at reasonable times for their observation, inspecting and testing. The CONTRACTOR shall provide proper and safe conditions for such access.

12.3 Tests and Inspections:

12.3.1 The CONTRACTOR shall give the Project Manager timely notice of readiness of the Work for all required inspections, tests or Approvals.

12.3.2 If Regulatory Requirements of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, the CONTRACTOR shall assume full responsibility therefore, pay all costs in connection therewith and furnish the Project Manager the required certificates of inspection, testing or approval. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with AUTHORITY's acceptance of a Supplier of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for Approval prior to the CONTRACTOR's purchase thereof for incorporation in the Work. The cost of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by the CONTRACTOR. The AUTHORITY may perform additional tests and inspections which it deems necessary to insure quality control. All such failed tests or inspections shall be at the CONTRACTOR's expense.

12.3.4 If any Work (including the work of others) that is to be inspected, tested or Approved is covered without written concurrence of the Project Manager, it must, if requested by the Project Manager, be uncovered for observation. Such uncovering shall be at the CONTRACTOR's expense unless the CONTRACTOR has given the Project Manager timely notice of CONTRACTOR's intention to cover the same and the Project Manager has not acted with reasonable promptness in response to such notice.

12.3.5 Neither observations nor inspections, tests or Approvals by the AUTHORITY or others shall relieve the CONTRACTOR from the CONTRACTOR's obligations to perform the Work in accordance with the Contract Documents.

12.4 Uncovering Work:

12.4.1 If any Work is covered contrary to the written request of the Project Manager, it must, if requested by the Project Manager, be uncovered for the Project Manager's observation and replaced at the CONTRACTOR's expense.

12.4.2 If the Project Manager considers it necessary or advisable that covered Work be observed inspected or tested, the CONTRACTOR, at the Project Manager's request, shall uncover, expose or otherwise make available for observation, inspection or testing

as the Project Manager may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is Defective, the CONTRACTOR shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) and the AUTHORITY shall be entitled to an appropriate decrease in the Contract Price. If, however, such Work is not found to be Defective, the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction.

12.5 AUTHORITY May Stop the Work:

If the Work is Defective, or the CONTRACTOR fails to supply suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, the Contracting Officer may order the CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Contracting Officer to stop the Work shall not give rise to any duty on the part of the Contracting Officer to exercise this right for the benefit of the CONTRACTOR or any other party.

12.6 Correction or Removal of Defective Work:

If required by the Project Manager, the CONTRACTOR shall promptly, as directed, either correct all Defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by the Project Manager, remove it from the site and replace it with Work which conforms to the requirements of the Contract Documents. The CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

12.7 One Year Correction Period:

If within one year after the date of Substantial Completion of the relevant portion of the Work or such longer period of time as may be prescribed by Regulatory Requirements or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be Defective, the CONTRACTOR shall promptly, without cost to the AUTHORITY and in accordance with the Project Manager's written instructions, either correct such Defective Work, or, if it has been rejected by the Project Manager, remove it from the site and replace it with conforming Work. If the CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the AUTHORITY may have the Defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by the CONTRACTOR. In special circumstances where a particular item of equipment is placed in continuous service for the benefit of the AUTHORITY before Substantial Completion of all the Work, the correction period for that item may begin on an earlier date if so provided in the Specifications or by Change Order. Provisions of this paragraph are not intended to shorten the statute of limitations for bringing an action.

12.8 Acceptance of Defective Work:

Instead of requiring correction or removal and replacement of Defective Work, the Project Manager may accept Defective Work, the CONTRACTOR shall bear all direct, indirect and consequential costs attributable to the Project Manager's evaluation of and determination to accept such Defective Work (costs to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the AUTHORITY shall be entitled to an appropriate decrease in the Contract Price. If the AUTHORITY has already made final payment to the CONTRACTOR, an appropriate amount shall be paid by the CONTRACTOR or his Surety to the AUTHORITY.

12.9 AUTHORITY May Correct Defective Work:

If the CONTRACTOR fails within a reasonable time after written notice from the Project Manager to proceed to correct Defective Work or to remove and replace rejected Work as required by the Project Manager in accordance with paragraph 12.6, or if the CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if the CONTRACTOR fails to comply with any other provision of the Contract Documents, the AUTHORITY may, after 7 days' written notice to the CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph the AUTHORITY shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, the Project Manager may exclude the CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend the CONTRACTOR's services related thereto, take possession of the CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or approved remote storage sites or for which the AUTHORITY has paid the CONTRACTOR but which are stored elsewhere. The CONTRACTOR shall allow the Project Manager and his authorized representatives such access to the site as may be necessary to enable the Project Manager to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of the AUTHORITY in exercising such rights and remedies will be charged against the CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the AUTHORITY shall be entitled to an appropriate decrease in the Contract Price. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of the CONTRACTOR's Defective Work. The CONTRACTOR shall not be allowed an extension of time because of any delay in performance of the work attributable to the exercise, by the Project Manager, of the AUTHORITY's rights and remedies hereunder.

ARTICLE 13 - PAYMENTS TO CONTRACTOR AND COMPLETION

13.1 Schedule of Values:

The Schedule of Values established as provided in paragraph 6.6 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Project Manager. Progress payments on account of Unit Price Work will be based on the number of units completed.

13.2 Preliminary Payments:

Upon approval of the Schedule of Values the CONTRACTOR may be paid for direct costs substantiated by paid invoices and other prerequisite documents required by the General Requirements. Direct costs shall include the cost of bonds, insurance, approved materials stored on the site or at approved remote storage sites, deposits required by a Supplier prior to fabricating materials, and other approved direct mobilization costs substantiated as indicated above. These payments shall be included as a part of the total Contract Price as stated in the Contract.

13.3 Application for Progress Payment:

The CONTRACTOR shall submit to the Project Manager for review an Application for Payment filled out and signed by the CONTRACTOR covering the Work completed as of the date of the Application for Payment and accompanied by such supporting documentation as is required by the Contract Documents. Progress payments will be made as the Work progresses on a monthly basis.

13.4 Review of Applications for Progress Payment:

Project Manager will either indicate in writing a recommendation of payment or return the Application for Payment to the CONTRACTOR indicating in writing the Project Manager's reasons for refusing to recommend payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the Application for Payment.

13.5 Stored Materials and Equipment:

If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, paid invoice or other documentation warranting that the AUTHORITY has received the materials and equipment free and clear of all charges, security interests and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the AUTHORITY's interest therein, all of which will be satisfactory to the Project Manager. No payment will be made for perishable materials that could be rendered useless because of long storage periods. No progress payment will be made for living plant materials until planted.

13.6 CONTRACTOR's Warranty of Title:

The CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to the AUTHORITY no later than the time of payment free and clear of any claims, liens, security interests and further obligations.

13.7 Withholding of Payments:

The AUTHORITY may withhold or refuse payment for any of the reasons listed below provided it gives written notice of its intent to withhold and of the basis for withholding:

- 13.7.1 The Work is Defective, or completed Work has been damaged requiring correction or replacement, or has been installed without Approval of Shop Drawings, or by an unapproved Subcontractor, or for unsuitable storage of materials and equipment.
- 13.7.2 The Contract Price has been reduced by Change Order,
- 13.7.3 The AUTHORITY has been required to correct Defective Work or complete Work in accordance with paragraph 12.9.
- 13.7.4 The AUTHORITY's actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.2.1.a through 14.2.1.k inclusive.
- 13.7.5 Claims have been made against the AUTHORITY or against the funds held by the AUTHORITY on account of the CONTRACTOR's actions or inactions in performing this Contract, or there are other items entitling the AUTHORITY to a set off.
- 13.7.6 Subsequently discovered evidence or the results of subsequent inspections or test, nullify any previous payments for reasons stated in subparagraphs 13.7.1 through 13.7.5.
- 13.7.7 The CONTRACTOR has failed to fulfill or is in violation of any of his obligations under any provision of this Contract.

13.8 Retainage:

At any time the AUTHORITY finds that satisfactory progress is not being made it may in addition to the amounts withheld under 13.7 retain a maximum amount equal to 10% of the total amount earned on all subsequent progress payments. This retainage may be released at such time as the Project Manager finds that satisfactory progress is being made.

13.9 Request for Release of Funds:

If the CONTRACTOR believes the basis for withholding is invalid or no longer exists, immediate written notice of the facts and Contract provisions on which the CONTRACTOR relies, shall be given to the AUTHORITY, together with a request for release of funds and adequate documentary evidence proving that the problem has been cured. In the case of withholding which has occurred at the request of the Department of Labor, the CONTRACTOR shall provide a letter from the Department of Labor stating that withholding is no longer requested. Following such a submittal by the CONTRACTOR, the AUTHORITY shall have a reasonable time to investigate and verify the facts and seek additional assurances before determining whether release of withheld payments is justified.

13.10 Substantial Completion:

When the CONTRACTOR considers the Work ready for its intended use the CONTRACTOR shall notify the Project Manager in writing that the Work or a portion of Work which has been specifically identified in the Contract Documents is substantially complete (except for items specifically listed by the CONTRACTOR as incomplete) and request that the AUTHORITY issue a certificate of Substantial Completion. Within a reasonable time thereafter, the Project Manager, the CONTRACTOR and Engineer(s) shall make an inspection of the Work to determine the status of completion. If the Project Manager does not consider the Work substantially complete, the Project Manager will notify

the CONTRACTOR in writing giving the reasons therefore. If the Project Manager considers the Work substantially complete, the Project Manager will within fourteen days execute and deliver to the CONTRACTOR a certificate of Substantial Completion with tentative list of items to be completed or corrected. At the time of delivery of the certificate of Substantial Completion the Project Manager will deliver to the CONTRACTOR a written division of responsibilities pending Final Completion with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties which shall be consistent with the terms of the Contract Documents.

The AUTHORITY shall be responsible for all AUTHORITY costs resulting from the initial inspection and the first re-inspection, the CONTRACTOR shall pay all costs incurred by the AUTHORITY resulting from re-inspections, thereafter.

13.11 Access Following Substantial Completion:

The AUTHORITY shall have the right to exclude the CONTRACTOR from the Work after the date of Substantial Completion, but the AUTHORITY shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

13.12 Final Inspection:

Upon written notice from the CONTRACTOR that the entire Work or an agreed portion thereof is complete, the Project Manager will make a final inspection with the CONTRACTOR and Engineer(s) and will notify the CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or Defective. The CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies. The CONTRACTOR shall pay for all costs incurred by the AUTHORITY resulting from re-inspections.

13.13 Final Completion and Application for Payment:

After the CONTRACTOR has completed all such corrections to the satisfaction of the Project Manager and delivered schedules, guarantees, bonds, certificates of payment to all laborers, Subcontractors and Suppliers, and other documents - all as required by the Contract Documents; and after the Project Manager has indicated in writing that the Work has met the requirements for Final Completion, and subject to the provisions of paragraph 13.18, the CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all remaining certificates, warranties, guarantees, releases, affidavits, and other documentation required by the Contract Documents.

13.14 Final Payment:

13.14.1 If on the basis of the Project Manager's observation of the Work during construction and final inspection, and the Project Manager's review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents; and the Project Manager is satisfied that the Work has been completed and the CONTRACTOR's other obligations under the Contract Documents have been fulfilled, the AUTHORITY will process final Application for Payment. Otherwise, the Project Manager will return the Application for Payment to the CONTRACTOR, indicating in writing the reasons for refusing to process final payment,

in which case the CONTRACTOR shall make the necessary corrections and resubmit the final Application for Payment.

13.14.2 If, through no fault of the CONTRACTOR, Final Completion of the Work is significantly delayed, the Project Manager shall, upon receipt of the CONTRACTOR's final Application for Payment, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the AUTHORITY for Work not fully completed or corrected is less than the retainage provided for in paragraph 13.9, and if bonds have been furnished as required in paragraph 5.1, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the CONTRACTOR to the AUTHORITY with the application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

13.15 Final Acceptance:

Following certification of payment of payroll and revenue taxes, and final payment to the CONTRACTOR, the AUTHORITY will issue a letter of Final Acceptance, releasing the CONTRACTOR from further obligations under the Contract, except as provided in paragraph 13.17.

When it is anticipated that restarting, testing, adjusting, or balancing of systems will be required following Final Acceptance and said requirements are noted in Section(s) 01 77 00, such Work shall constitute a continuing obligation under the Contract.

13.16 CONTRACTOR's Continuing Obligation:

The CONTRACTOR's obligation to perform and complete the Work and pay all laborers, Subcontractors, and material men in accordance with the Contract Documents shall be absolute. Neither any progress or final payment by the AUTHORITY, nor the issuance of a certificate of Substantial Completion, nor any use or occupancy of the Work or any part thereof by the AUTHORITY or Owner, nor any act of acceptance by the AUTHORITY nor any failure to do so, nor any review and Approval of a Shop Drawing or sample submission, nor any correction of Defective Work by the AUTHORITY will constitute an acceptance of Work not in accordance with the Contract Documents or a release of the CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents.

13.17 Waiver of Claims by CONTRACTOR:

The making and acceptance of final payment will constitute a waiver of all claims by the CONTRACTOR against the AUTHORITY other than those previously made in writing and still unsettled.

13.18 No Waiver of Legal Rights:

The AUTHORITY shall not be precluded or be estopped by any payment, measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefore, from showing the true amount and character of the Work performed and materials furnished by the CONTRACTOR, nor from showing that any payment, measurement, estimate or certificate is untrue or is incorrectly made, or that the Work or materials are Defective. The AUTHORITY shall not be precluded or estopped,

notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the CONTRACTOR or his Sureties, or both, such damages as it may sustain by reason of his failure to comply with requirements of the Contract Documents. Neither the acceptance by the AUTHORITY, or any representative of the AUTHORITY, nor any payment for or acceptance of the whole or any part of the Work, nor any extension of the Contract Time, nor any possession taken by the AUTHORITY, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or of any right to damages. A waiver by the AUTHORITY of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

ARTICLE 14 - SUSPENSION OF WORK, DEFAULT AND TERMINATION

14.1 AUTHORITY May Suspend Work:

14.1.1 The AUTHORITY may, at any time, suspend the Work or any portion thereof by notice in writing to the CONTRACTOR. If the Work is suspended without cause the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if the CONTRACTOR makes an Approved claim therefore as provided in Article 15. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that suspension is due to the fault or negligence of the CONTRACTOR, or that suspension is necessary for Contract compliance, or that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the CONTRACTOR.

14.1.2 In case of suspension of Work, the CONTRACTOR shall be responsible for preventing damage to or loss of any of the Work already performed and of all materials whether stored on or off the site or Approved remote storage sites.

14.2 Default of Contract:

14.2.1 The Contracting Officer may give the contractor and his surety a written Notice to Cure Default if the contractor:

- a. fails to begin work in the time specified,
- b. fails to use sufficient resources to assure prompt completion of the work,
- c. performs the work unsuitably or neglect or refuse to remove and replace rejected materials or work,
- d. stops work,
- e. fails to resume stopped work after receiving notice to do so,
- f. becomes insolvent (except that if you declare bankruptcy, termination will be under Title 11 US Code 362 and/or 365. Your bankruptcy does not relieve the surety of any obligations to assume the Contract and complete the work in a timely manner.
- g. Allows any final judgment to stand against him unsatisfied for period of 60 days, or
- h. Makes an assignment for the benefit of creditors without the consent of the Contracting Officer, or
- i. Disregards Regulatory Requirements of any public body having jurisdiction,

or

- j. Otherwise violates in any substantial way any provisions of the Contract Documents, or
- k. fails to comply with Contract minimum wage payments or civil rights requirements, or
- l. are party to fraud, deception, misrepresentation , or
- m. for any cause whatsoever, fails to carry on the Work in an acceptable manner.

14.2.2 The Notice to Cure Default will detail the conditions determined to be in default, the time within which to cure the default and may, in the Contracting Officer's discretion, specify the actions necessary to cure the default. Failure to cure the delay, neglect or default within the time specified in the Contracting Officer's written notice to cure authorizes the Authority to terminate the contract. The Contracting Officer may allow more time to cure than originally stated in the Notice to Cure Default if he deems it to be in the best interests of the Authority. The Authority will provide you and your surety with a written Notice of Default Termination that details the default and the failure to cure it.

14.2.3 If the CONTRACTOR or Surety, within the time specified in the above notice of default, shall not proceed in accordance therewith, then the AUTHORITY may, upon written notification from the Contracting Officer of the fact of such delay, neglect or default and the CONTRACTOR's failure to comply with such notice, have full power and authority without violating the Contract, to take the prosecution of the Work out of the hands of the CONTRACTOR. The AUTHORITY may terminate the services of the CONTRACTOR, exclude the CONTRACTOR from the site and take possession of the Work and of all the CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by the CONTRACTOR (without liability to the CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which the AUTHORITY has paid the CONTRACTOR but which are stored elsewhere, and finish the Work as the AUTHORITY may deem expedient. The AUTHORITY may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, or use such other methods that in the opinion of the Contracting Officer are required for the completion of said Contract in an acceptable manner.

14.2.4 The Contracting Officer may, by written notice to the CONTRACTOR and his Surety or his representative, transfer the employment of the Work from the CONTRACTOR to the Surety, or if the CONTRACTOR abandons the Work undertaken under the Contract, the Contracting Officer may, at his option with written notice to the Surety and without any written notice to the CONTRACTOR, transfer the employment for said Work directly to the Surety. The Surety shall submit its plan for completion of the Work, including any contracts or agreements with third parties for such completion, to the AUTHORITY for Approval prior to beginning completion of the Work. Approval of such contracts shall be in accordance with all applicable requirements and procedures for Approval of subcontracts as stated in the Contract Documents.

14.2.5 After the notice of termination is issued, the Authority may take over the work and complete it by contract or otherwise and may take possession of and use materials, appliances, equipment or plant on the work site necessary for

completing the work.

- 14.2.6 Rather than taking over the work itself, the Authority may transfer the obligation to perform the work from the contractor to your surety. The surety must submit its plan for completion of the work, including any contracts or agreements with third parties for completion, to the Authority for approval prior to beginning work. The surety must follow the Contract requirements for approval of subcontracts, except that the limitation on percent of work subcontracted will not apply.
- 14.2.7 On receipt of the transfer notice, the surety must take possession of all materials, tools, and appliances at the work site, employ an appropriate work force, and complete the Contract work, as specified. The Contract specifications and requirements shall remain in effect. However the Authority will make subsequent Contract payments directly to the Surety for work performed under the terms of the Contract. CONTRACTOR forfeits any right to claim for the same work or any part thereof. CONTRACTOR is not entitled to receive any further balance of the amount to be paid under the Contract.
- 14.2.8 Upon receipt of the notice terminating the services of the CONTRACTOR, the Surety shall enter upon the premises and take possession of all materials, tools, and appliances thereon for the purpose of completing the Work included under the Contract and employ by contract or otherwise any person or persons to finish the Work and provide the materials therefore, without termination of the continuing full force and effect of this Contract. In case of such transfer of employment to the Surety, the Surety shall be paid in its own name on estimates covering Work subsequently performed under the terms of the Contract and according to the terms thereof without any right of the CONTRACTOR to make any claim for the same or any part thereof.
- 14.2.9 If the Contract is terminated for default, the CONTRACTOR and the Surety shall be jointly and severally liable for damages for delay as provided by paragraph 11.8, and for the excess cost of completion, and all costs and expenses incurred by the AUTHORITY in completing the Work or arranging for completion of the Work, including but not limited to costs of assessing the Work to be done, costs associated with advertising, soliciting or negotiating for bids or proposals for completion, and other procurement costs. Following termination the CONTRACTOR shall not be entitled to receive any further balance of the amount to be paid under the Contract until the Work is fully finished and accepted, at which time if the unpaid balance exceeds the amount due the AUTHORITY and any amounts due to persons for whose benefit the AUTHORITY has withheld funds, such excess shall be paid by the AUTHORITY to the CONTRACTOR. If the damages, costs, and expenses due the AUTHORITY exceed the unpaid balance, the CONTRACTOR and his Surety shall pay the difference.
- 14.2.10 If, after notice of termination of the CONTRACTOR's right to proceed under the provisions of this clause, it is determined for any reason that the CONTRACTOR was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, or that termination was wrongful, the rights and obligations of the parties shall be determined in accordance with the clause providing for convenience termination.

14.3 Rights or Remedies:

Where the CONTRACTOR's services have been so terminated by the AUTHORITY, the

termination will not affect any rights or remedies of the AUTHORITY against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due the CONTRACTOR by the AUTHORITY will not release the CONTRACTOR from liability.

14.4 Convenience Termination:

14.4.1 The performance of the Work may be terminated by the AUTHORITY in accordance with this section in whole or in part, whenever, for any reason the Contracting Officer shall determine that such termination is in the best interest of the OWNER. Any such termination shall be effected by delivery to the CONTRACTOR of a Notice of Termination, specifying termination is for the convenience of the AUTHORITY the extent to which performance of Work is terminated, and the date upon which such termination becomes effective.

14.4.2 Immediately upon receipt of a Notice of Termination and except as otherwise directed by the Contracting Officer, the CONTRACTOR shall:

- a. Stop Work on the date and to the extent specified in the Notice of Termination;
- b. Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the Work as is not terminated;
- c. Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination;
- d. With the written Approval of the Contracting Officer, to the extent he may require, settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, the cost of which would be reimbursable, in whole, or in part, in accordance with the provisions of the Contract;
- e. Submit to the Contracting Officer a list, certified as to quantity and quality, of any or all items of termination inventory exclusive of items the disposition of which had been directed or authorized by the Contracting Officer;
- f. Transfer to the Contracting Officer the completed or partially completed record drawings, Shop Drawings, information, and other property which, if the Contract had been completed, would be required to be furnished to the AUTHORITY;
- g. Take such action as may be necessary, or as the Contracting Officer may direct, for the protection and preservation of the property related to the Contract which is in the possession of the CONTRACTOR and in which the AUTHORITY has or may acquire any interest.

The CONTRACTOR shall proceed immediately with the performance of the above obligations.

14.4.3 When the AUTHORITY orders termination of the Work effective on a certain date, all Work in place as of that date will be paid for in accordance with Article 13 of the Contract. Materials required for completion and on hand but not incorporated in the Work will be paid for at invoice cost plus 15 % with materials becoming the property of the AUTHORITY - or the CONTRACTOR may retain title to the materials and be paid an agreed upon lump sum. Materials on order

shall be cancelled, and the AUTHORITY shall pay reasonable factory cancellation charges with the option of taking delivery of the materials in lieu of payment of cancellation charges. The CONTRACTOR shall be paid 10% of the cost, freight not included, of materials cancelled, and direct expenses only for CONTRACTOR chartered freight transport which cannot be cancelled without charges, to the extent that the CONTRACTOR can establish them. The extra costs due to cancellation of bonds and insurance and that part of job start-up and phase-out costs not amortized by the amount of Work accomplished shall be paid by the AUTHORITY. Charges for loss of profit or consequential damages shall not be recoverable except as provided above.

- a. The following costs are not payable under a termination settlement agreement or Contracting Officer's determination of the termination claim:
 1. Loss of anticipated profits or consequential or compensatory damages
 2. Unabsorbed home office overhead (also termed "General & Administrative Expense") related to ongoing business operations
 3. Bidding and project investigative costs
 4. Direct costs of repairing equipment to render it operable for use on the terminated work

14.4.4 The termination claim shall be submitted promptly, but in no event later than 90 days from the effective date of termination, unless extensions in writing are granted by the Contracting Officer upon written request of the CONTRACTOR made within the 90 day period. Upon failure of the CONTRACTOR to submit his termination claim within the time allowed, the Contracting Officer may determine, on the basis of information available to him, the amount, if any, due to the CONTRACTOR by reason of the termination and shall thereupon pay to the CONTRACTOR the amount so determined.

14.4.5 The CONTRACTOR and the Contracting Officer may agree upon whole or any part of the amount or amounts to be paid to the CONTRACTOR by reason of the total or partial termination of Work pursuant to this section. The Contract shall be amended accordingly, and the CONTRACTOR shall be paid the agreed amount.

14.4.6 In the event of the failure of the CONTRACTOR and the Contracting Officer to agree in whole or in part, as provided heretofore, as to the amounts with respect to costs to be paid to the CONTRACTOR in connection with the termination of the Work the Contracting Officer shall determine, on the basis of information available to him, the amount, if any, due to the CONTRACTOR by reason of the termination and shall pay to the CONTRACTOR the amount determined as follows:

- a. All costs and expenses reimbursable in accordance with the Contract not previously paid to the CONTRACTOR for the performance of the Work prior to the effective date of the Notice of Termination;
- b. So far as not included under "a" above, the cost of settling and paying claims arising out of the termination of the Work under subcontracts or orders which are properly chargeable to the terminated portions of the Contract;
- c. So far as practicable, claims by the contractor for idled or stand-by equipment shall be made as follows: Equipment claims will be reimbursed as follows:

1. Contractor-owned equipment usage, based on the contractor's ownership and operating costs for each piece of equipment as determined from the contractor's accounting records. Under no circumstance, may the contractor base equipment claims on published rental rates.
 2. Idle or stand-by time for Contractor-owned equipment, based on your internal ownership and depreciation costs. Idle or stand-by equipment time is limited to the actual period of time equipment is idle or on stand-by as a direct result of the termination, not to exceed 30 days. Operating expenses will not be included for payment of idle or stand-by equipment time.
 3. Rented equipment, based on reasonable, actual rental costs. Equipment leased under "capital leases" as defined in Financial Accounting Standard No. 13 will be considered Contractor-owned equipment. Equipment leased from an affiliate, division, subsidiary or other organization under common control with you will be considered Contractor-owned equipment, unless the lessor has an established record of leasing to unaffiliated lessees at competitive rates consistent with the rates you have agreed to pay and no more than forty percent of the lessor's leasing business, measured in dollars, is with organizations affiliated with the lessor.
- 14.4.7 The CONTRACTOR shall have the right of appeal under the AUTHORITY's claim procedures, as defined in Article 15, for any determination made by the Contracting Officer, except if the CONTRACTOR has failed to submit his claim within the time provided and has failed to request extension of such time, CONTRACTOR shall have no such right of appeal. In arriving at the amount due the CONTRACTOR under this section, there shall be deducted:
- a. All previous payments made to the CONTRACTOR for the performance of Work under the Contract prior to termination;
 - b. Any claim for which the AUTHORITY may have against the CONTRACTOR;
 - c. The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the CONTRACTOR or sold pursuant to the provisions of this section and not otherwise recovered by or credited to the AUTHORITY; and,
 - d. All progress payments made to the CONTRACTOR under the provisions of this section.
- 14.4.8 Where the Work has been terminated by the AUTHORITY said termination shall not affect or terminate any of the rights of the AUTHORITY against the CONTRACTOR or his Surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the AUTHORITY due to the CONTRACTOR under the terms of the Contract shall not release the CONTRACTOR or his Surety from liability.
- 14.4.9 The contractor's termination claim may not include claims that pre dated the notice for termination for convenience. Those claims shall be prosecuted by the contractor under Article 15.
- 14.4.10 The contractor's termination claim may not exceed the total dollar value of the contract as awarded plus agreed upon change orders less the amounts that have been paid for work completed.

- a. Unless otherwise provided for in the Contract Documents, or by applicable statute, the CONTRACTOR, from the effective date of termination and for a period of three years after final settlement under this Contract, shall preserve and make available to the AUTHORITY at all reasonable times at the office of the CONTRACTOR, all its books, records, documents, and other evidence bearing on the cost and expenses of the CONTRACTOR under his Contract and relating to the Work terminated hereunder.
- b. Cost Principles. The Authority may use the federal cost principles at 48 CFR §§ 31.201-1 to 31.205-52 (or succeeding cost principles for fixed price contracts) as guidelines in determining allowable costs under this Subsection to the extent they are applicable to construction contracts and consistent with the specifications of this Contract. The provisions of this contract control where they are more restrictive than, or inconsistent with, these federal cost principles.”

ARTICLE 15 - CLAIMS AND DISPUTES

15.1 Notification

- 15.1.1 The CONTRACTOR shall notify the AUTHORITY in writing as soon as the CONTRACTOR becomes aware of any act or occurrence which may form the basis of a claim for additional compensation or an extension of Contract Time or of any dispute regarding a question of fact or interpretation of the Contract. The AUTHORITY has no obligation to investigate any fact or occurrence that might form the basis of a claim or to provide any additional compensation or extension of Contract Time unless the CONTRACTOR has notified the AUTHORITY in writing in a timely manner of all facts the CONTRACTOR believes form the basis for the claim.
- 15.1.2 If the CONTRACTOR believes that he is entitled to an extension of Contract Time, then the CONTRACTOR must state the contract section on which he basis his extension request, provide the AUTHORITY with sufficient information to demonstrate that the CONTRACTOR has suffered excusable delay, and show the specific amount of time to which the CONTRACTOR is entitled. The AUTHORITY will not grant an extension of Contract Time if the CONTRACTOR does not timely submit revised schedules under **Section 01 32 00**.
- 15.1.3 If the matter is not resolved by agreement within 7 days, the CONTRACTOR shall submit an Intent to Claim, in writing, to the AUTHORITY within the next 14 days.
- 15.1.4 If the CONTRACTOR believes additional compensation or time is warranted, then he must immediately begin keeping complete, accurate, and specific daily records concerning every detail of the potential claim including actual costs incurred. The CONTRACTOR shall provide the AUTHORITY access to any such records and furnish the AUTHORITY copies, if requested. Equipment costs must be based on the CONTRACTOR's internal rates for ownership, depreciation, and operating expenses and not on published rental rates. In computing damages, or costs claimed for a change order, or for any other claim against the Authority for additional time, compensation or both, the contractor must prove actual damages based on internal costs for equipment, labor or efficiencies. Total cost, modified total cost or jury verdict forms of presentation of damage claims are not permissible to show damages. Labor inefficiencies must be

shown to actually have occurred and can be proven solely based on job records. Theoretical studies are not a permissible means of showing labor inefficiencies. Home office overhead will not be allowed as a component of any claim against the Authority.

- 15.1.5 If the claim or dispute is not resolved by the Project Manager, then the CONTRACTOR shall submit a written Claim to the Contracting Officer within 90 days after the CONTRACTOR becomes aware of the basis of the claim or should have known the basis of the claim, whichever is earlier. The Contracting Officer will issue written acknowledgment of the receipt of the Claim.
- 15.1.6 The CONTRACTOR waives any right to claim if the AUTHORITY was not notified properly or afforded the opportunity to inspect conditions or monitor actual costs or if the Claim is not filed on the date required.

15.2 Presenting the Claim

15.2.1 The Claim must include all of the following:

- a. The act, event, or condition the claim is based on
- b. The Contract provisions which apply to the claim and provide relief
- c. The item or items of Contract work affected and how they are affected
- d. The specific relief requested, including Contract Time if applicable, and the basis upon which it was calculated
- e. A statement certifying that the claim is made in good faith, that the supporting cost and pricing data are accurate and complete to the best of your knowledge and belief, and that the amount requested accurately reflects the Contract adjustment which the CONTRACTOR believes is due.

15.3 Claim Validity, Additional Information, and AUTHORITY's Action

- 15.3.1 The Claim, in order to be valid, must not only show that the CONTRACTOR suffered damages or delay but that it was caused by the act, event, or condition complained of and that the Contract provides entitlement to relief for such act, event, or condition.
- 15.3.2 The AUTHORITY can make written request to the CONTRACTOR at any time for additional information relative to the Claim. The CONTRACTOR shall provide the AUTHORITY the additional information within 30 days of receipt of such a request. Failure to furnish the additional information may be regarded as a waiver of the Claim.

15.4 Contracting Officer's Decision

- 15.4.1 The CONTRACTOR will be furnished the Contracting Officer's Decision within 90 days, unless the Contracting Officer requests additional information or gives the CONTRACTOR notice that the time for issuing a decision is being extended for a specified period. The Contracting Officer's decision is final and conclusive unless, within 14 days of receipt of the decision, the CONTRACTOR delivers a Notice of Appeal to the Executive Director of the Authority.

15.5 Appeals on a Contract Claim.

- 15.5.1 An appeal from a decision of the Contracting Officer on a contract claim may be filed by the CONTRACTOR with the Executive Director of the Authority.

The appeal shall be filed within 14 days after the decision is received by the CONTRACTOR. An appeal by the CONTRACTOR may not raise any new factual issues or theories of recovery that were not presented to and decided by the Contracting Officer in the decision under Section 15.4, except that a CONTRACTOR may increase the contractor's calculation of damages if the increase arises out of the same operative facts on which the original claim was based. The CONTRACTOR shall file a copy of the appeal with the Contracting Officer.

- a. An appeal must contain a copy of the decision being appealed and identification of the factual or legal errors in the decision that form the basis for the appeal.
- b. The Executive Director shall handle the appeal of a claim under this section expeditiously.

15.6 Construction Contract Claim Appeals.

15.6.1 The appeal from a decision of the Contracting Officer of a claim involving a construction contract shall be resolved by:

- a. binding and final arbitration under AS 09.43.010 - 09.43.180 (Uniform Arbitration Act) if the claim is:
 1. less than \$250,000 and the CONTRACTOR requests arbitration of the claim; or
 2. \$250,000 or more and both the agency and the CONTRACTOR agree to arbitration of the claim; or
- b. a hearing under the Authority's established policy and procedures if the claim is not handled by arbitration under 15.6.1 of this subsection.

15.7 Fraud and Misrepresentation in Making Claims

Criminal and Civil penalties authorized under State or federal law (including, but not limited to, forfeiture of all claimed amounts) may be imposed on the CONTRACTOR if the CONTRACTOR makes or uses a misrepresentation in support of a claim or defraud or attempt to defraud the AUTHORITY at any stage of prosecuting a claim under this Contract.”

This page is blank intentionally.

**SECTION 00 80 00
SUPPLEMENTARY CONDITIONS
MODIFICATIONS TO THE GENERAL CONDITIONS**

The following supplements modify, change, delete from, or add to Section 00 70 00 "General Conditions of the Construction Contract for Buildings", revised December, 2011. Where any article of the General Conditions is modified, or a Paragraph, Subparagraph, or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause shall remain in effect.

SC-1-DEFINITIONS

A. Add the following definitions:

1. **QUALITY ASSURANCE ACCEPTANCE TESTING** – This is all sampling and testing performed by the CONTRACTOR to determine at what level the product or service will be accepted for payment. Qualified personnel and laboratories will perform sampling and testing. The AUTHORITY pays for this testing.
2. **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.
3. **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 the first four words of the first sentence ("The Contracting Officer will ...") and replace with the following words "The Contracting Officer has the right to, but is not obligated to..."

SC-4.2–VISIT TO SITE

At General Conditions Article 4.2, delete this article in its entirety and replace with the following article:

“A. A formal visit to the site will occur as noted on the Invitation to Bid”.

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 AUTHORITY 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 AUTHORITY. The reports and other records are not intended as a substitute for independent investigation, interpretation, or judgment of the Bidder. The AUTHORITY 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.”

SC-5.4.1 – INSURANCE REQUIREMENTS

At General Condition Article 5.4.1, delete the second to the last sentence and replace with the following:
“The delivery to the AUTHORITY 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. Workers' Compensation Insurance: 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 Authority.
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.
4. 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."

At General Conditions Article 5.4.2 add the following Paragraph:

- f. Contractor to provide Marine Cargo Carriage Insurance for the full value of all materials in transport.

SC-9.4-CHANGE ORDER

A. At General Conditions Article 9.4, add the following sentence:

"The AUTHORITY will issue Change Orders for the CONTRACTOR to sign. A Change Order shall be considered executed when the AUTHORITY signs it. The CONTRACTOR'S signature indicates that they accept the Change Order or acknowledge it. Acknowledgement of a Change Order does not surrender the CONTRACTOR'S right to claim."

SC-11.8-DELAY DAMAGES

At General Condition Article 11.8, add the following paragraphs:

11.8.1 For each calendar day that the Work is not Substantially Complete after the expiration of the Contract Time or the completion date has passed, the AUTHORITY shall deduct \$500 from progress payments.

11.8.2 If no money is due the CONTRACTOR, the AUTHORITY 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 AUTHORITY for its additional administrative expenses incurred due to CONTRACTOR'S failure to complete the work within the time specified.

11.8.3 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 AUTHORITY'S rights to collect liquidated damages under this section.

SC-12.1-WARRANTY AND GUARANTEE

At General Condition Article 12.1, add the following sentence:

"The failure of the AUTHORITY 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 AUTHORITY’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 AUTHORITY, and may be ordered removed or replaced at no additional cost to the AUTHORITY.”

SC-15.6– Construction Contract Claim Appeals.

Delete 15.6 in its entirety.

END OF SECTION 00 80 00

REQUIRED CONTRACT PROVISIONS
For
FEDERAL-AID CONSTRUCTION CONTRACTS

- I. General
- II. Non-discrimination
- III. Non-segregated Facilities³
- IV. Payment of Predetermined Minimum Wages
- V. Statements and Payrolls
- VI. Record of Materials, Supplies, and Labor
- VII. Subletting or Assigning the Contract
- VIII. Safety: Accident Prevention
- IX. False Statements
- X. Implementation of Clean Air Act and Federal Water Pollution Control Act
- XI. Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
- XII. Certification Regarding Use of Contract Funds for Lobbying

I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the Contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of these Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

- Section I, paragraph 2;
- Section IV, paragraphs 1, 2, 3, 4, and 7;
- Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. Selection of Labor: During the performance of this contract, the contractor shall not:

- a. discriminate against labor from any other State, possession, or territory of the United States, or
- b. Employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION (Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630 and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the Alaska Energy Authority (AEA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the AEA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the AEA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the AEA.

8. Selection of Subcontractors, Procurement of Materials, and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 26 shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from AEA personnel.

c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years

following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the AEA and the U.S. DOT.

a. The records kept by the contractor shall document the following:

(1) The number of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

(4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. The contractors will submit an annual report to the AEA each July for the duration of the project, indicating the number of minority, women, and non minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on the job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES (Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

1. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO Provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

2. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, or national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

3. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to the award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGES (Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. General:

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on

any account [except such payroll deductions as are permitted by regulations (29 CFR 3) issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c] the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. Classification:

a. The AEA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) The work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) The additional classification is utilized in the area by the construction industry;

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the U.S. Department of Labor, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days

of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. Payment of Fringe Benefits:

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. Apprentices and Trainees (Programs of the U. S. DOL) and Helpers:

a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers: Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, which is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. Apprentices and Trainees (Programs of the U.S. DOT): Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and

trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. **Withholding:** The AEA shall, upon its own action or upon written request of an authorized representative of the DOL, withhold or cause to be withheld from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the AEA Procurement Officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. **Overtime Requirements:** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such work week unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. **Violation: Liability for Unpaid Wages; Liquidated Damages:** In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible therefor shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. **Withholding for Unpaid Wages and Liquidated Damages:** The AEA shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

V. STATEMENTS AND PAYROLLS (Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. **Compliance with Copeland Regulations (29 CFR 3):** The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. **Payrolls and Payroll Records:**

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b) (2) (B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish each week in which any contract work is performed a payroll of wages paid each of its employees (including apprentices, trainees, and helpers described in Section IV, paragraphs 4 and 5 and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402 or the Government Bookstore, 915 Second Avenue, Seattle, WA 98174. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid in full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions set forth in the Regulations, 29 CFR 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this section V available for inspection, copying, or transcription by authorized representatives of the AEA, the U.S. DOT, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the AEA, the U.S. DOT, DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any

further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

VI. RECORDS OF MATERIALS, SUPPLIES, AND LABOR (Applicable to highway contracts)

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR Part 635) the contractor shall:

a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on the Form FHWA-47.

c. Furnish, upon the completion of the contract, to the AEA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

VII. SUBLETTING OR ASSIGNING THE CONTRACT

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items so performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR Part 635).

a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph 1 of this Section VII is computed includes the cost of materials and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the AEA contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the AEA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the AEA is assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY: ACCIDENT PREVENTION

1. In the performance of this contract, the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the AEA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract entered into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

IX. FALSE STATEMENTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. Title 18, United States Code, Section 1001, states:

“Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.” (June 25, 1948, ch. 645, 62 Stat. 749.)

To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all personnel concerned with the project:

X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or more.)

By submission of this bid, or the execution of this contract or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub. L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, et seq., as amended by Pub. L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR Part 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.
3. That the firm shall promptly notify the AEA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
4. That the firm agrees to include or cause to be included the requirements of paragraphs 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

1. Instructions for Certification - Primary Covered Transactions: (Applicable to all Federal-aid contracts - 49 CFR 29)
 - a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.
 - b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
 - c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.
 - d. The prospective primary participant shall provide immediate written notice to the department or agency to which this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
 - e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.
 - f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from

participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded from Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion—Primary Covered Transactions

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and

d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Covered Transactions: (Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “primary covered transaction,” “participant,” “person,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,” without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

g. A participation in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment,

Suspension, Ineligibility and Voluntary Exclusion—Lower Tier Covered Transactions:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING (Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

This page is blank intentionally.

SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section describes the project and the work to be performed under this Contract. Detailed requirements and extent of work are stated in applicable Specification sections and shown on the Drawings.

1.02 ORGANIZATION AND INTERPRETATION OF CONTRACT DOCUMENTS

- A. Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance.
- B. Specification sections have not been divided into groups for work of subcontractors or various trades. Should there be questions concerning the applicability or interpretation of a particular section or part of a section or Drawing, direct questions to the Engineer.
- C. A part of the work that is necessary or required to make each installation satisfactory and operable for its intended purpose, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if it were described in the Specifications and shown on the Drawings.

1.03 DESCRIPTION OF PROJECT

- A. Scope
 - 1. This project consists of a general contract to furnish all labor, materials, equipment, consumables, supervision, transportation, freight, subsistence, expertise and incidentals necessary to complete the Twin Hills Rural Power System Upgrade Project as identified in the Contract Documents.
 - 2. All work is included in the Base Bid and any Additive Alternates awarded unless otherwise indicated and can be generally described as providing the following as appropriate for each bid item and additive alternate:
 - a. Pre-construction and post construction costs of obtaining all required bonds, permits and other costs Contractor must incur before beginning the work.
 - b. Mobilization and demobilization.
 - c. Construction surveying and staking
 - d. Erecting, maintaining and removing all temporary structures, storage yards, erosion control measures, and other construction facilities.

- e. Disassembly, relocation and/or reassembly of existing structures that interfere with execution of the work, including boardwalks, steambaths, and other miscellaneous structures.
 - f. Receipt of any owner furnished materials.
 - g. Furnishing and installation of H-piles
 - h. Furnishing and installation of helical pile guy anchors and guy lines.
 - i. Furnishing and installation of electrical primary and secondary cable, controls and power poles.
 - j. Furnishing and Installation of transformers
 - k. Providing temporary power to structures affected by the construction.
 - l. Demolition of existing primary and secondary distribution components taken out of service as a result of the project.
 - m. Onsite Safety.
 - n. Testing and Quality Control
 - o. All other work and material that may be indicated or shown on the drawings, described in the specifications, and/or is needed to make a complete and fully functioning electrical distribution system.
- B. The Contractor shall, except as otherwise specifically stated in applicable parts of these Contract Documents, provide and pay for labor, materials, equipment, tools, construction equipment, facilities, and services necessary for proper execution, testing, and completion of the work.

1.04 DESCRIPTION OF BID ITEMS

A. Bid Item 1: Construct Electrical Intertie

1. The lump sum bid for Bid Item 1 shall include full payment for all labor, material, freight and equipment required to install all system components shown on the drawings to make a complete and functional electrical intertie system, including :
 - a. Electrical Intertie: All driven and helical piles, helical anchors, poles, cross arms, guys, catenary lighting system, switches, transformers, conductor and associated components and hardware to complete the intertie as shown on the plans and described in the project specifications. The bid item includes Togiak poles 10 to 10-7 and poles T1 to T89 inclusive.
2. Work shall also include energizing and testing the new intertie and demolition of all existing system components taken out of service as a result of work completed under this bid item in accordance with the project plans and specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

B. Bid Item 2: Local Hire Allowance

1. This item is a contingent sum allowance for local hire. The contractor is expected to utilize the local labor pool to the greatest extent possible. Prior to the first pay application, the contractor shall submit a plan to utilize local labor and provide a cost estimate for the total local labor payroll. Local labor will be employed directly by the Contractor.

C. Additive Alternate A: Construct Twin Hills Distribution System Upgrades

1. The lump sum bid for Additive Alternate A shall include full payment for all labor, material, freight and equipment required to furnish and install all required poles, conductor, transformers, switch cabinets, hardware, guy anchors, guy lines, and other components to upgrade the Twin Hills Electrical Distribution System as shown on the plans and described in the project specifications. This bid item includes poles 0 to 9-3-6A, 9-4 to 25A, and T90 to T92 inclusive.
2. Work shall also include energizing and testing the new system components installed under this bid item, and demolition of all existing system components taken out of service as a result of this bid item as shown in the plans and described in the project specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

D. Additive Alternate B: Construct Standby Power Module

1. The lump sum bid for Additive Alternate B shall include full payment for all labor, material, freight and equipment required to install all system components shown on the drawings to make a complete and functional standby power module, including:
 - a. Standby Power Module: All fabrication, structural, architectural, mechanical, and electrical components, site preparation, clearing and grubbing, earthwork, grounding systems, concrete foundations, fuel piping, connections to and modifications to existing bulk fuel storage tanks, level sensors, fence and gates, and associated components and hardware as shown on the plans and described in the project specifications.
2. Work shall also include energizing and testing the new standby module and disconnecting the existing power plant from the system in accordance with the project plans and specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

E. Additive Alternate C: Construct Twin Hills Distribution System South Extension A

1. The lump sum bid for Additive Alternate C shall include full payment for all labor, material, freight and equipment required to furnish and install all required poles, conductor, transformers, switch cabinets, hardware, guy anchors, guy lines, and other components to extend the Twin Hills

Electrical Distribution System as shown on the plans and described in the project specifications. This bid item includes poles 9-3-7 to 9-3-31 inclusive.

2. Work shall also include energizing and testing the new system components installed under this bid item.
3. Measurement for payment shall be lump sum complete in place.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 02 00

INTENT OF DOCUMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Explanation of intent and terminology of the Construction Documents.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions.

1.03 SPECIFICATION FORMAT AND COMPOSITION

- A. Specifications are divided into Divisions and Sections for the convenience of writing and using. Titles are not intended to imply a particular trade jurisdiction. AUTHORITY is not bound to define the limits of any subcontract, and will not enter into disputes between the CONTRACTOR and his employees, including Subcontractors.
- B. Pages are numbered independently for each Section, and recorded in the Table of Contents. Section number is shown with the page number at the bottom of each page. The end of each Section of the Specifications is ended by “End of Section”. It is CONTRACTOR’S responsibility to verify that Contract Documents received for bidding and/or construction are complete in accordance with Table of Contents.
- C. The language employed in the Contract Documents is addressed directly to the CONTRACTOR. Imperative or indicative language is generally employed throughout and requirements expressed are the mandatory responsibility of the CONTRACTOR, even though the Work specified may be accomplished by specialty subcontractors engaged by the CONTRACTOR. References to third parties in this regard shall not be interpreted in any way as to relieve the CONTRACTOR of his or her responsibility under this Contract.
- D. These Specifications are of the abbreviated or “streamlined” type, and may include incomplete sentences.
- E. Omissions of words or phrases such as “the CONTRACTOR shall”, “in conformity therewith”, “shall be”, “as noted on the Drawings”, “according to the Drawings”, “a”, “an”, “the” and “all” are intentional.
- F. Omitted words or phrases shall be supplied by inference in the same manner as they are when a “note’ occurs on the Drawings.

1.04 DRAWINGS: CONTENT EXPLANATION

- A. Drawings, Dimensions and Measurements.

1. Contract Documents do not purport to describe in detail, absolute and complete construction information. Drawings are diagrammatic. CONTRACTOR shall provide verification of actual site conditions and shall provide complete and operational systems as specified when Drawings do not provide full detail.

1.05 COMMON TERMINOLOGY

- A. Certain items used generally throughout the Specifications and Drawings are used as follows:
 1. Indicated: The term "indicated" is a cross reference to details, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar means of recording requirements in the Contract Documents. Where terms such as "shown", "noted", "schedules", and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader accomplish the cross reference, and no limitation of location is intended except as specifically noted.
 2. Installer: The person or entity engaged by CONTRACTOR, his Subcontractor or sub-subcontractor for the performance of a particular unit of Work at the Project site, including installation, erection, application and similar required operations. It is a general requirement that installers be recognized experts in the work they are engaged to perform.
 3. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean "...supply and deliver to the Project site, ready for unpacking, assembly and installation..."
 4. Guarantee and Warranty: "Warranty" is generally used in conjunction with products manufactured or fabricated away from the Project site, and "guarantee" is generally used in conjunction with units of work which require both products and substantial amounts of labor at the Project site. The resulting difference is that warranties are frequently issued by manufacturers, and guarantees are generally issued by CONTRACTOR and frequently supported (partially) by product warranties from manufacturers.

1.06 CONFLICTS

- A. Report any conflicts to AUTHORITY for clarification.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 02 70

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions: Article 13, Progress Payments, and Final Payment.
- B. Document 008000 – Supplementary Conditions.
- C. Section 013000 – Submittals.
- D. Section 013700 – Schedule of Values.
- E. Section 017000 – Project Closeout.
- F. Section 017200 – Project Record Documents
- G. Section 017700 – Contract Closeout.

1.03 FORMAT

- A. Application for Payment form as provided by the AUTHORITY or Contractor's Form containing same information.

1.04 PREPARATION OF APPLICATIONS

- A. Type required information on Application for Payment form approved by AUTHORITY.
- 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 products. Indicate percent complete for each item, value for invoice submitted, total value billed, and totals for each column.

- 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 for application of Final Payment as specified in Section 017700 – Contract Closeout.

1.05 SUBMITTAL PROCEDURES

- A. Submit original plus three (3) copies and one (1) copy electronically of each Application for Payment at times stipulated in Contract.
- B. Submit under AUTHORITY accepted transmittal letter. Identify Contract by AUTHORITY Contract number.

1.06 SUBSTANTIATING DATA

- A. When AUTHORITY requires substantiating information, submit data justifying line item amounts in question.
- B. Provide two (2) copies 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 013000 – Submittals.
 - 2. Updated Schedule of Values as required by Section 013700 – Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 02 80

CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Procedures for processing Change Orders.

1.02 RELATED SECTIONS

- A. Document 007000 - General Conditions: Articles 9, 10, and 11 – Governing requirements for changes in the Work, in Contract Price, and Contract Time.
- B. Document 008000 – Supplementary Conditions: Modifications to Document 007000 – General Conditions.
- C. Section 010270 – Applications for Payment.
- D. Section 013000 - Submittals.
- E. Section 013700 – Schedule of Values.
- F. Section 016300 – Product Options and Substitutions.
- G. Section 017700 – Contract Closeout.

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 AUTHORITY.

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. AUTHORITY 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 AUTHORITY 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 007000 – General Conditions.

1.07 LUMP SUM CHANGE ORDER

- A. CONTRACTOR shall submit an itemized price proposal in sufficient detail to fully explain the basis for the proposal. CONTRACTOR and AUTHORITY 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 break down, CONTRACTOR may be directed to perform the subject Work under a COST OF THE WORK CHANGE ORDER.
- B. The maximum rates of cost markup (to cover both overhead and profit of the CONTRACTOR) shall be per Section 007000 – General Conditions, Article 10, Paragraph 10.3 “Change Order Price Determination”.
- C. These terms shall also apply to the proposals of subcontracts 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 pre-determined Unit Prices and undetermined quantities, Change Order will be executed on an estimated quantity basis; payment will be based on actual quantities measured as specified.

1.09 COST OF THE WORK CHANGE ORDER

- A. CONTRACTOR shall submit documentation required in Paragraph 1.04 of this Section on a daily basis for certification by the AUTHORITY. The AUTHORITY will indicate by signature that the submitted documentation is acceptable. If it is not acceptable, CONTRACTOR and AUTHORITY shall immediately meet to discuss resolution.
- B. After completion of the change and within fourteen (14) Calendar Days, unless extended by the AUTHORITY, the CONTRACTOR shall submit in final form an itemized account with support data of all costs. Support data shall have been certified by the AUTHORITY, as required above in paragraph A.
- C. AUTHORITY will determine the change allowable in Contract Price and Contract Time as provided in provisions of the Contract Documents.

1.10 EXECUTION OF CHANGE ORDERS

- A. AUTHORITY 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 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section describes the project and the work to be performed under this Contract. Detailed requirements and extent of work are stated in applicable Specification sections and shown on the Drawings.

1.02 ORGANIZATION AND INTERPRETATION OF CONTRACT DOCUMENTS

- A. Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance.
- B. Specification sections have not been divided into groups for work of subcontractors or various trades. Should there be questions concerning the applicability or interpretation of a particular section or part of a section or Drawing, direct questions to the Engineer.
- C. A part of the work that is necessary or required to make each installation satisfactory and operable for its intended purpose, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if it were described in the Specifications and shown on the Drawings.

1.03 DESCRIPTION OF PROJECT

- A. Scope
 - 1. This project consists of a general contract to furnish all labor, materials, equipment, consumables, supervision, transportation, freight, subsistence, expertise and incidentals necessary to complete the Twin Hills Rural Power System Upgrade Project as identified in the Contract Documents.
 - 2. All work is included in the Base Bid and any Additive Alternates awarded unless otherwise indicated and can be generally described as providing the following as appropriate for each bid item and additive alternate:
 - a. Pre-construction and post construction costs of obtaining all required bonds, permits and other costs Contractor must incur before beginning the work.
 - b. Mobilization and demobilization.
 - c. Construction surveying and staking
 - d. Erecting, maintaining and removing all temporary structures, storage yards, erosion control measures, and other construction facilities.

- e. Disassembly, relocation and/or reassembly of existing structures that interfere with execution of the work, including boardwalks, steambaths, and other miscellaneous structures.
 - f. Receipt of any owner furnished materials.
 - g. Furnishing and installation of H-piles
 - h. Furnishing and installation of helical pile guy anchors and guy lines.
 - i. Furnishing and installation of electrical primary and secondary cable, controls and power poles.
 - j. Furnishing and Installation of transformers
 - k. Providing temporary power to structures affected by the construction.
 - l. Demolition of existing primary and secondary distribution components taken out of service as a result of the project.
 - m. Onsite Safety.
 - n. Testing and Quality Control
 - o. All other work and material that may be indicated or shown on the drawings, described in the specifications, and/or is needed to make a complete and fully functioning electrical distribution system.
- B. The Contractor shall, except as otherwise specifically stated in applicable parts of these Contract Documents, provide and pay for labor, materials, equipment, tools, construction equipment, facilities, and services necessary for proper execution, testing, and completion of the work.

1.04 DESCRIPTION OF BID ITEMS

A. Bid Item 1: Construct Electrical Intertie

1. The lump sum bid for Bid Item 1 shall include full payment for all labor, material, freight and equipment required to install all system components shown on the drawings to make a complete and functional electrical intertie system, including :
 - a. Electrical Intertie: All driven and helical piles, helical anchors, poles, cross arms, guys, switches, transformers, conductor and associated components and hardware to complete the intertie as shown on the plans and described in the project specifications. Additive Alternate A includes Togiak poles 10 to 10-7 and poles T1 to T89 inclusive.
2. Work shall also include energizing and testing the new intertie and demolition of all existing system components taken out of service as a result of work completed under this bid item in accordance with the project plans and specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

B. Bid Item 2: Local Hire Allowance

1. This item is a contingent sum allowance for local hire. The contractor is expected to utilize the local labor pool to the greatest extent possible. Prior to the first pay application, the contractor shall submit a plan to utilize local labor and provide a cost estimate for the total local labor payroll. Local labor will be employed directly by the Contractor.

C. Additive Alternate A: Construct Twin Hills Distribution System Upgrades

1. The lump sum bid for Additive Alternate A shall include full payment for all labor, material, freight and equipment required to furnish and install all required poles, conductor, transformers, switch cabinets, hardware, guy anchors, guy lines, and other components to upgrade the Twin Hills Electrical Distribution System as shown on the plans and described in the project specifications. This bid item includes poles 0 to 9-3-6A, 9-4 to 25A, and T90 to T92 inclusive.
2. Work shall also include energizing and testing the new system components installed under this bid item, and demolition of all existing system components taken out of service as a result of this bid item as shown in the plans and described in the project specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

D. Additive Alternate B: Construct Standby Power Module

1. The lump sum bid for Additive Alternate B shall include full payment for all labor, material, freight and equipment required to install all system components shown on the drawings to make a complete and functional standby power module, including:
 - a. Standby Power Module: All fabrication, structural, architectural, mechanical, and electrical components, site preparation, clearing and grubbing, earthwork, grounding systems, concrete foundations, fuel piping, connections to and modifications to existing bulk fuel storage tanks, level sensors, fence and gates, and associated components and hardware as shown on the plans and described in the project specifications.
2. Work shall also include energizing and testing the new standby module and disconnecting the existing power plant from the system in accordance with the project plans and specifications.
3. Work shall also include transportation of demolished items to a permitted landfill or other location approved by the Utility and the Authority.
4. Measurement for payment shall be lump sum complete in place.

E. Additive Alternate C: Construct Twin Hills Distribution System South Extension A

1. The lump sum bid for Additive Alternate C shall include full payment for all labor, material, freight and equipment required to furnish and install all required poles, conductor, transformers, switch cabinets, hardware, guy anchors, guy lines, and other components to extend the Twin Hills

Electrical Distribution System as shown on the plans and described in the project specifications. This bid item includes poles 9-3-7 to 9-3-31 inclusive.

2. Work shall also include energizing and testing the new system components installed under this bid item.
3. Measurement for payment shall be lump sum complete in place.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 11 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABLE CODES, STANDARDS, AND REGULATORY REQUIREMENTS

All work shall be in accordance with the latest adopted edition of governing Codes and Regulations including but are not limited to:

1. Alaska Department of Environmental Conservation (ADEC) Regulations including 18AAC75
2. United States Army Corps of Engineers
3. American National Standards Institute (ANSI)
4. American Society of Mechanical Engineers (ASME)
5. Environmental Protection Agency (EPA) Regulations
6. American Society of Testing and Materials (ASTM)
7. American Society of Mechanical Engineers (ASME)
8. Institute of Electrical and Electronic Engineers (IEEE)
9. International Fire Code (IFC)
10. International Building Code (IBC)
11. National Fire Protection Association (NFPA) NFPA 30
12. National Electrical Safety Code (NESC), ANSI C2-2007
13. Occupational Safety and Health Administration (OSHA)
14. Underwriters Laboratories (U.L.)
15. Rural Utility Service (RUS)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 12 60

CONTRACTOR'S CERTIFICATION OF SUBCONTRACT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparing, submitting and accepting subcontracts.

1.02 RELATED SECTIONS

- A. Document 001200 – Required Documents, Required After Notice of Apparent Low Bidder.
- B. Document 004300 – Subcontractor List.
- C. Document 007000 – General Conditions.
- D. Section 013000 – Submittals.

1.03 PREPARATION

- A. Certification Forms: Use forms provided by AUTHORITY.
- B. CONTRACTOR to prepare certification form and submit to the AUTHORITY prior to the start of Work. All subcontracts shall be included in 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 certification forms in accordance with the submittal requirements identified under Paragraph 1.02 D of this Section.

1.05 CONSIDERATION OF CERTIFICATION

- A. Following receipt of submittal and within a reasonable period of time AUTHORITY 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 per paragraph 1.04 of this Section.
1. The CONTRACTOR shall not award any Work to any Subcontractor without prior written Approval of the AUTHORITY.
 2. Payment will not be made for Work performed by a Subcontractor not approved (non-certified) by the AUTHORITY.

1.06 ACKNOWLEDGMENT OF CERTIFICATION

- A. Submittals which have been examined by the AUTHORITY and are determined to be complete and properly executed shall be acknowledged as such by the AUTHORITY's signature on the face of each certification form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 30 00

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and procedures necessary for scheduling, preparation, and submission of submittals.

1.02 RELATED SECTIONS

- A. Individual Specification sections in these Contract Documents contain additional and special submittal requirements. Individual sections shall take precedence in the event of a conflict with this section.
- B. Document 007000 – General Conditions, Paragraphs 6.9, 6.10 and 6.11 for substitutes, and Paragraphs 6.20 and 6.21 for shop drawings.
- C. Document 007000 – General Conditions, Paragraphs 6.6, 6.7 and 6.8 for Progress Schedules.
- D. Document 007000 – General Conditions, Paragraph 6.16 for Record Documents.
- E. Section 013100 – Progress Schedules.
- F. Section 013700 – Schedule of Values.
- G. Section 014000 – Quality Control.
- H. Section 015000 – Temporary Facilities and Controls.
- I. Section 016000 – Materials and Products.
- J. Section 016300 – Product Options and Substitutions.
- K. Section 017000 – Project Closeout.
- L. Section 017200 – Project Record Documents.
- M. Section 017700 – Contract Closeout.
- N. All Technical Specifications.

1.03 SUBMITTALS

- A. Work Plan as required by the Special Conditions in Document 008000 – Supplementary Conditions.
- B. Erosion and Pollution Control Plans as required by the Special Conditions in Document 008000 – Supplementary Conditions.
- C. Schedule.
- D. Quality Control Submittals.
- E. Submittal's as indicated in 1.04 Submittal Schedule, and in individual specification sections.

1.04 SUBMITTAL SCHEDULE

Submittal items shall be submitted to the following locations as indicated:

<u>ITEM</u>	<u>ORIGINAL</u>	<u>COPY</u>
Schedule of Values	AUTHORITY	Engineer
* Construction Schedule	AUTHORITY	Engineer
* Subcontractor List	AUTHORITY	Engineer
* Contractor Questionnaire	AUTHORITY	Engineer
Work Plan	Engineer	AUTHORITY
Erosion and Pollution Control Plans	Engineer	AUTHORITY
Quality Control	Engineer	AUTHORITY
Product Options and Substitutions	Engineer	AUTHORITY
Pay Requests	AUTHORITY	Engineer
Change Order Requests or Proposals	AUTHORITY	Engineer
Design Clarification and Verification Requests	Engineer	AUTHORITY
Project Closeout Documents	AUTHORITY	Engineer
Request for Substantial Completion Inspection	AUTHORITY	Engineer
Contract Closeout Documents	AUTHORITY	Engineer
Request for Final Completion Inspection	AUTHORITY	Engineer
Project Record Documents	AUTHORITY	Engineer

* These items are required by Document 00120. All items required by Document 00120 but not listed here shall be submitted to the AUTHORITY.

1.05 SUBMITTAL PROCEDURES

- A. AUTHORITY reserves the right to modify the procedures and requirements for submittals, as necessary, to accomplish the specific purpose of each submittal. Direct inquiries to Engineer regarding the procedure, purpose, or extent of any submittal.
- B. Review, acceptance, or approval of substitutions, schedules, shop drawings, list of materials, and procedures submitted or requested by Contractor shall not add to the Contract amount, and additional costs which may result therefrom shall be solely the obligation of Contractor.
- C. Contractor shall be responsible for performing necessary analysis research, data gathering, code analysis, and cost estimating for review and acceptance by the Engineer when the Contractor submits a substitution as an equal product.
- D. AUTHORITY is not precluded, by virtue of review, acceptance, or approval, from obtaining a credit for construction savings resulting from allowed concessions in the work or materials therefore.
- E. AUTHORITY is not responsible to provide engineering or other services to protect Contractor from additional costs accruing from submittals.
- F. Submittals processed by Engineer do not become Contract Documents and are not Change Orders; the purpose of submittal review is to establish a reporting procedure and is intended for Contractor's convenience in organizing the work, and to permit Engineer to monitor Contractor's progress and understanding of the design.
- G. Delays caused by the need for resubmittal shall not constitute basis for claim.
- H. After checking and verifying all field measurements, make submittal to Engineer in accordance with the submittal schedule for review.
 - 1. Submittals shall bear a stamp or specific written indication that Contractor has satisfied its responsibilities under the Contract Documents with respect to the review of the submittal.
 - 2. Data shown shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable Engineer to review the information.
- I. Check samples, and accompany with specific written indication that Contractor has satisfied requirements under the Contract Documents with respect to review of submittals, and identify clearly as to material, supplier, pertinent data such as catalog numbers and the intended use.
- J. Before submission of each submittal, determine and verify quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto; review and coordinate

each submittal with other submittals, requirements of the work, and the Contract Documents.

- K. At the time of each submission, give Engineer specific written notice of each variation that the submittal may have from the requirements of the Contract Documents. In addition, make specific notation on each shop drawing submitted to Engineer for review and approval of each such variation.
- L. Engineer's review will be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents, not extending to means, methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents), nor to safety precautions or programs incident thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions.
- M. Engineer's review of submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing, called Engineer's attention to each such variation at the time of submission, and Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the shop drawing or sample approval; nor will any approval by Engineer relieve Contractor from responsibility for errors or omissions in the shop drawings, or from responsibility for having complied with the provisions herein.
- N. Where a shop drawing or sample is required by the Specifications, related work performed prior to Engineer's review and approval of the pertinent submission shall be the sole expense and responsibility of Contractor.

1.06 ADMINISTRATIVE SUBMITTALS

- A. Provide administrative submittals required by the Bidding Requirements, General Conditions, Special Conditions, and as may be specifically required in other parts of the Contract Documents.
- B. Make required submittals promptly to the applicable federal, state, or local agency, as required by law. Failure to comply with this requirement may result in withholding of progress payments and make Contractor liable for other prescribed action and sanctions.
- C. Submit to AUTHORITY a copy of all letters relative to this Contract, including notifications, reports, certifications, payroll and the like, that are submitted directly to a federal, state, or other governing agency.

1.07 SCHEDULES

- A. General:
 - 1. Submit Schedules in accordance with Section 013100.

2. Revise, resubmit, and identify all changes made from previously submitted schedules throughout the duration of the project to keep all schedules up to date.

1.08 QUALITY CONTROL SUBMITTALS

- A. Submit Quality Control Submittals as identified in the Specifications and on the Drawings per most recent edition of the NESC and RUS Standards.
- B. Certification of Compliance:
 1. Where specified, furnish certification of compliance for products specified to a recognized standard or code prior to the use of such products in the work.
 - a. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by a certification of compliance.
 - b. Certifications shall be signed by the manufacturer of the product; state that the components involved comply in all respects with the requirements of the Specifications.
 - c. Furnish certification of compliance with each lot delivered to the job site, and clearly identify the lot so certified.
 2. Products used on the basis of a certification of compliance may be sampled and tested at any time. The fact that a product is used on the basis of a certification of compliance shall not relieve the Contractor of responsibility for incorporating products in the work, which conforms to requirements of the Contract Documents. Products not conforming to such requirements will be subject to rejection whether in-place or not.

1.09 CONTRACT CLOSEOUT SUBMITTALS

- A. Record Drawings:
 1. Maintain a current listing and description of each change incorporated into the work and note same on mark-up drawing set. Provide mark-up drawing set to the Engineer prior to or during the substantial completion inspection. Engineer will prepare a set of record drawings for the project from the Contractor provided annotated drawings, which will include the changes made in materials, equipment, locations, and dimensions of the work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 00

PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Detailed scheduling requirements and procedures including preparation, interim schedule, and overall schedule.
- B. Preconstruction conference requirements.
- C. Monthly progress report requirements.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraphs 6.6, 6.7 and 6.8 for Anticipated Schedules, Finalizing Schedules, and Adjusting Schedules.
- B. Section 013000 – Submittals.

1.03 SUBMITTALS

- A. Submit the following items as specified in this section:
 - 1. Gantt Chart, not CPM (Critical Path Method) nodal analysis.

1.04 CONSTRUCTION SCHEDULE RESPONSIBILITIES

- A. Contractor shall accept the risk for delays caused by the rate of progress of work to be executed under Contract. Contractor shall be responsible for scheduling work.

1.05 PROGRESS OF THE WORK

- A. General:
 - 1. Execute work with such progress as necessary to prevent delay to the overall completion of the project.
 - 2. Execute the work at such times and on such parts of the project, and with such forces, materials and equipment to assure completion in the time established by the Contract.

1.06 PRECONSTRUCTION CONFERENCE

- A. Within twenty (20) days following execution of Contract but before start of work at the site, Contractor shall meet with AUTHORITY and Engineer for discussion of scheduling requirements per Section 013200 – Project Meetings.
- B. Prior to start of work at the site, Contractor shall meet with AUTHORITY and Engineer for an update of scheduling requirements per Section 013200 – Project Meetings.

1.07 SCHEDULE

- A. General:
 - 1. Contractor shall prepare and submit within fourteen (14) days after the award of Contract, a schedule comprised of all construction operations in connection with the Contract.
- B. Schedule Requirements:
 - 1. Schedule type shall be a Gantt chart. Draw or print the schedule on reproducible paper, not larger than 30 inches by 42 inches, and show the sequence and interdependence of activities required for complete performance of all items of work.
- C. Acceleration:
 - 1. If at any time during the project Contractor fails to complete an activity by its latest scheduled completion date, which late completion will impact the end date of the work past the Contract completion date, submit within seven (7) calendar days plans to reorganize the work force to return to the current schedule.
 - 2. The AUTHORITY may require Contractor to add equipment or construction forces, as well as increase working hours, if operations fall behind schedule at any time.
 - 3. Addition of equipment or construction forces, increasing working hours, or other method, manner, or procedure to return to the contractually required completion date will not be justification for Contract modification or treated as a schedule acceleration by the AUTHORITY.
 - 4. Contractor shall plan, schedule, and coordinate construction operations and activities in a manner that will facilitate progress of work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00

PROJECT MEETINGS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Preconstruction Conference: Contractor shall attend a mandatory preconstruction conference at Alaska Energy Authority, 813 West Northern Lights Blvd, Anchorage, Alaska 99503, (907) 771-3000.
1. As a minimum, the following project representatives will attend:
 - a. AUTHORITY's project manager
 - b. Engineer's project manager
 - c. Contractor's project manager
 - d. Contractor's superintendent
 - e. Subcontractors whom the Contractor or Engineer has requested may attend.
 2. The Engineer shall develop an agenda for the preconstruction conference approximately one (1) week prior to the meeting. Minimum agenda is a follows:
 - a. Identification of Responsible Parties
 - b. Contract Information
 - c. DCVRs, Procedures, Contractor Questions and AUTHORITY Directions
 - d. Change Order Procedures
 - e. Project Schedule (provided by the Contractor)
 - f. Schedule of Values
 - g. Pay Requests
 - h. List of Subcontractors
- B. Job Site Preconstruction Meeting: Contractor shall hold a mandatory preconstruction meeting at the job site within 7-days of start of construction. Contractor shall provide minimum 7-days notice to the AUTHORITY of the meeting date and location. The Contractor is responsible to provide the meeting facilities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 37 00

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide a detailed breakdown of the agreed Contract Sum showing amounts allocated to each of the various parts of the work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. Preparation and submittal of a Schedule of Values is required by the General Conditions.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraph 13.1, Schedule of Values.

1.03 SUBMITTALS

- A. Within seven (7) days after the Preconstruction Conference and prior to first application for payment, submit a proposed Schedule of Values to the Engineer based on the schedule breakdown in Part 2.01 of this section.
 - 1. Prepare Schedule of Values for the project with tasks identified outlined by this section.
 - 2. Meet with the Engineer and AUTHORITY to determine additional data, if any, required to be submitted.
 - 3. Secure the Engineer and AUTHORITY's acceptance of the Schedule of Values prior to submitting first application for payment.

1.04 QUALITY ASSURANCE

- A. Assure arithmetical accuracy of the sums described.
- B. When so required by the Engineer, provide copies of documentation or other data acceptable to the Engineer, substantiating the sums described.
 - 1. Support documentation might include, but not be limited to the following:
 - a. Insurance and bond invoices
 - b. Copies of subcontracts
 - c. Bills of lading
 - d. Material invoices
 - e. Freight invoices

PART 2 PRODUCTS

2.01 SCHEDULE OF VALUES BREAKDOWN

- A. The following is the minimum acceptable breakdown:

1. Bond and insurance
 2. General Conditions (categorize as required)
 3. Freight (categorize as required)
 4. Mobilization
 5. Demobilization
 6. Standby Module
 7. H-Piles
 8. Helical Piles
 9. OH Primary Cable (by type)
 10. OH Secondary Cable (by type)
 11. Transformers
 12. RUS Units – Breakdown As Approved by Engineer
 13. Final Clean-up and Punch List
- B. All unit costs above shall be “installed” costs. The sum of the Schedule of Values breakdown shall equal to the total Contract Price.
- C. The Schedule of Values shall serve as a basis for calculating progress payments during construction and shall be presented in such detail to allow the AUTHORITY to accurately verify the amount and value of work completed as defined in the Contractor’s invoice.
- D. The Schedule of Values shall correspond to the activities on the Construction Schedule.
- E. All components or items not listed in the Schedule of Values shall be incidental to one of the Units listed.
- F. The Schedule of Values shall be submitted to the Engineer for review and approval prior to the first pay request. The Engineer shall have final authority over the content of the Schedule of Values.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 40 00
QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contractor's quality assurance program and control procedures in executing the work.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Article 12, Quality Assurance.
- B. Section 013000 – Submittals
- C. Section 016000 – Materials and Products
- D. All Technical Specifications.

1.03 SUBMITTALS

- A. Submit a quality control plan for review and approval.
- B. Contractor's weekly reports.

1.04 DISCREPANCIES

- A. If this section and the NESC and RUS codes conflict, the more stringent requirement shall apply.

1.05 GENERAL

- A. This section identifies Contractor Quality Control (QC) requirements and to assist:
 - 1. Planning of Quality Control Work
 - 2. Providing of the appropriate Quality Control Personnel
 - 3. Assurance of Quality Work
- B. The Engineer's function is to plan, design, and review the construction of the PROJECT. Their responsibility to the AUTHORITY is to ensure the completion of the project within the parameters established by cost and schedule, while meeting all the design requirements. The Engineer's function does not include any supervision of Contractor's employees.
- C. Documentation is an extremely important component of the QC effort. Documentation is required by law and is the basis of evidence that the facility was constructed as designed and approved. By his signature, the quality assurance reviewer, whether he is in the Contractor's employment, attests to and certifies that the report is a factual summation of what he has reviewed during the period covered by this report.

1.06 MEASURING/TESTING EQUIPMENT REQUIREMENTS

- A. Calibration and control of measuring/test equipment shall be performed by the Contractor. The Contractor will use the equipment in accordance with the equipment manufacturer's requirements and approved procedures.

1.07 CONSTRUCTION INSPECTION AND TESTS

- A. General construction inspection shall be established by the Contractor using approved procedures.
- B. Systems for performing inspection at the construction site by the Contractor shall be established and implemented according to approved procedures which assure that the quality of materials, work in process, and completed construction conforms to Contract requirements. Inspection, instruction, and test procedures include acceptance criteria as specified in these Specifications and any other regulatory requirements.

1.08 QUALITY CONTROL RECORDS

- A. Required records and data shall be compiled and maintained by the Contractor in accordance to the Specifications. As-builts drawings, Specifications, and engineering documents shall be maintained by the Contractor.

1.09 CONTRACTOR'S QC INSPECTORS

- A. If, in the opinion of the Engineer, Contractor's QC inspection staff is insufficient or unqualified to perform satisfactory quality control in accordance with the Contract documents, Contractor shall replace or supplement QC staff as directed by the Engineer at no cost to the AUTHORITY.
- B. General duties and responsibilities of the Contractor's quality control team are:
 - 1. Chief Inspector: The Chief Inspector's duties and responsibilities shall include, but are not limited to the following:
 - a. Be thoroughly familiar with and understand Contract Documents and construction codes.
 - b. Assure that all inspectors have current certifications in their pertinent inspection disciplines. Moreover, assure competence of inspectors in their disciplines.
 - c. Determine quantities of work completed for preparation of progress pay estimates.
 - d. Assure that all inspectors work in a safe manner and that they report unsafe practices or work areas.
 - e. Complete appropriate daily report for inspection activities.
 - f. Maintain a personal project log noting important job-related events of each work day.
 - g. Verify that all inspection activities are conducted in accordance with all aforementioned documents.
 - h. Report unsafe work practices and areas.
 - i. Assure compliance with the Contract Documents.
 - j. Prepare daily reports summarizing field data.
 - k. Inspect material quality.
 - l. Verify all field testing is performed in accordance with written procedures.

- m. Verify all field testing results.
- n. Coordinate overall quality control plan and provide consolidated QC reporting to the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TESTING

- A. Contract QC inspector shall be responsible for implementing and assuring the performance of testing required to assure the completed facilities will be in conformance with the contract documents. Testing shall be conducted as indicated in the specifications.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes requirements for temporary facilities and controls, including utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities
 - 3. Heating and cooling facilities
 - 4. Ventilation
 - 5. Electric power service
 - 6. Lighting
 - 7. Telephone/facsimile
- C. Support facilities include, but are not limited to, the following:
 - 1. Project identification and temporary signs
 - 2. Water storage facilities
 - 3. Waste disposal facilities
 - 4. Office or common use facility
 - 5. Storage
 - 6. Lifts and hoists
 - 7. Temporary ladders and scaffolding
 - 8. Construction aides and miscellaneous services and facilities
- D. Security and protection facilities include but are not limited to, the following:
 - 1. Environmental protection
 - 2. Temporary secure enclosures

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraph 6.14, Use of Premises, and Paragraph 7.6, Sanitary Provisions.

1.03 SUBMITTALS

- A. Submit temporary facility proposed locations, and construction.

1.04 USE CHARGES

- A. Cost or use charges for temporary facilities are not chargeable to the AUTHORITY or Engineer, and shall be included in the Contract Price. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Engineer
 - 2. AUTHORITY
 - 3. Personnel of authorities having jurisdiction.
- B. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities.
- C. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities.

1.05 PROJECT CONDITIONS

- A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 - 1. Keep temporary services and facilities clean and neat.
 - 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials or undamaged previously used materials in serviceable condition. Provide materials suitable for use intended.

2.02 EQUIPMENT

- A. Provide equipment suitable for use intended.
- B. Field Office: Local office with lockable entrances, operable windows, and serviceable finishes; heated; on foundations adequate for normal loading.
- C. Fire extinguishers: Hand carried, portable, UL rated.
- D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110V to 120V plus into higher voltage outlets; equipped with ground fault circuit interrupters, reset button and pilot light.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, AUTHORITY, and existing users for time when distribution system can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity for each stage of construction.
- B. Provide job site first aid kit, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include overload-protected disconnecting means, automatic ground-fault interrupters, and distribution panel. Provide meter if not provided by utility company.
- D. Telephone Service: Provide temporary telephone service throughout construction period for a common-use facility or office used by all personnel engaged in construction activities.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a telephone line for facsimile machine in each common use facility or office.
 - b. At each telephone, post a list of important telephone numbers.
 - 1. Police and fire departments
 - 2. Medical Emergency
 - 3. Contractor's home office
 - 4. Engineers' offices
 - 5. AUTHORITY's office
 - 6. Principal subcontractors' field and home offices.
 - c. Provide messaging service on superintendent's telephone.
 - d. Furnish superintendent with portable communications device for use when away from field office, i.e. Cellular phone, two-way radio, etc.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access in approved locations.
 - 2. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
 - 3. All facilities shall comply with OSHA regulations.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons in the vicinity of the Project site.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- C. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- D. Prevent water-filled piping from freezing.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with cleaning requirements in Section 01710 – Cleaning.

END OF SECTION

SECTION 01 60 00

MATERIALS AND PRODUCTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Transportation and Handling.
- C. Storage and Protection.
- D. Product Options.
- E. Contractor Representation.
- F. Systems Demonstration.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraph 6.5, Materials and Equipment.
- B. Section 011000 – Summary of Work.
- C. Section 013000 – Submittals.
- D. All Technical Specifications.

1.03 PRODUCTS

- A. Products include material, equipment and systems.
- B. Comply with Specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Specification section shall be the same and shall be interchangeable.

1.04 TRANSPORTATION AND HANDLING

- A. Transport products by methods to avoid product damage; deliver in dry, undamaged condition in manufacturer's unopened containers or packaging.

- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.05 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and maintained under required conditions until incorporated in the Work.

1.06 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers followed by the term "No Substitutions": Use only specified manufacturers, no substitutions allowed.
- B. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards.
- C. Whenever a material, article or piece of equipment is identified in the Contract Documents by reference to manufacturer's or vendor's names, trade names, catalog numbers, etc., it is intended to establish a minimum standard. Unless otherwise noted, any substitute material, article or equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design of the project will be considered equally acceptable; provided, the substitute material, article or equipment so proposed is, in the opinion of the Engineer, of equal substance, function, dimension, appearance and quality.
- D. Prior to the bid opening, the Bidder shall make his own determination in selecting which specified or substitute equipment to base his proposal upon. Substituted items shall be equal to or better than that specified or indicated in regards to quality, workmanship, finish, space requirements, electrical requirements, performance and warranties.

- E. After the bid opening, the Contractor shall submit sufficient data in accordance with this Section to establish equality. The Engineer shall be the sole judge of equality and acceptability.
- F. Acceptance of substitute materials will not relieve the Contractor of the responsibility for any changes in his own Work or in the Work of other crafts caused by the substitution. Any additional costs resulting from substitutions are the responsibility of the Contractor.
- G. 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 the cost of design, which costs shall be borne by the Contractor. Determination of a substitution request will be based on the Engineer's comparisons as to quality, adaptability, performance, aesthetics, Contract amount change, if applicable, etc., between the proposed substitution and specified item.
- H. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.
- I. Substitute products shall not be ordered or installed without written acceptance.

1.07 CONTRACTOR REPRESENTATION

- A. Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product.
- B. Contractor will provide same warranty for substitution as for specified product.
- C. Contractor will coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.
- D. Contractor certifies that cost data presented is complete and includes all related costs under this Contract.
- E. Contractor waives claims for additional costs related to substitution that may later become apparent.

1.08 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, Contractor will demonstrate operation of each system to Engineer.

- B. Contractor will instruct AUTHORITY's and Utility's personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 63 00

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section describes product options available to Bidders and the Contractor, plus procedures for securing approval of substitutions. Request for substitutions will not be considered prior to award of the Contract.

1.02 RELATED SECTIONS

- A. Documents affecting work of this section include, but are not necessarily limited to: General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
- B. Document 007000 – General Conditions, Paragraphs 6.9, 6.10 and 6.11 for Substitutes “or Equal” Items, Substitute Means and Methods, and Evaluation of Substitution.

1.03 SUBMITTALS

- A. Make submittals in accordance with pertinent provisions of the General Conditions and Section 013000.
- B. Submit options and substitutions under the Technical Specifications where the item is specified.

1.04 PRODUCT OPTIONS

- A. The Contract is based on standards of quality established in the Contract Documents.
 - 1. In agreeing to the terms and conditions of the Contract, the Contractor has accepted a responsibility to verify that the specified products will be available, and to place orders for all required materials in such a timely manner as is needed to meet his agreed construction schedule.
 - 2. Neither the AUTHORITY nor the Engineer has agreed to the substitution of materials or methods called for in the Contract Documents, except as they may specifically otherwise state in writing.
- B. Materials and/or methods specified by name:
 - 1. Where materials and/or methods are specified by naming one single manufacturer and/or model number, without stating that equal products will be considered, only the material and/or method named is approved for incorporation into the Work.
 - 2. Should the Contractor demonstrate to the satisfaction of the Engineer that a specified material or method was ordered in a timely manner and will not be available in time for incorporation into this Work, the

Contractor shall submit to the Engineer such data on proposed substitute materials and/or methods as are needed to help the Engineer determine suitability of the proposed substitution.

- C. Where materials and/or methods are specified by name and/or model number, followed by the words “or approved equal”, or “or equal as approved by the Engineer”:
 - 1. The material and/or method specified by name establish the required standard of quality.
 - 2. Materials and/or methods proposed by the Contractor to be used in lieu of materials and/or methods so specified by name, shall in all ways equal or exceed the qualities of the named materials and/or methods.
- D. The following products do not require further approval except for interface within the work:
 - 1. Products specified by reference to standard Specifications such as RUS and similar standards.
 - 2. Products specified by manufacturer’s name and catalog model number. All equipment and similar items provided “as specified” shall be submitted for record.
- E. Where the phrase “or equal”, “or approved equal”, “or equal as approved by the Engineer”, and “or approved substitute” occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this work by the Engineer.
- F. The decisions of the Engineer shall be final.

1.05 DELAYS

- A. Delays in construction arising by reason of the non-availability of a specified material and/or method will not be considered by the Engineer as justifying an extension of the agreed Time of Completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 70 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section describes an orderly and efficient transfer of the completed Work to the AUTHORITY.

1.02 RELATED SECTIONS

- A. Documents affecting work of this section include, but are not necessarily limited to: General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
- B. Activities relative to Substantial Completion, Project Closeout, and Contract Closeout are described in the General Conditions.
- C. Document 007000 – General Conditions, Paragraphs 13.10 and 13.12 for Substantial Completion and Final Completion.
- D. Section 017200 – Project Record Documents shall be submitted prior to Substantial Completion.
- C. Section 017700 – Contract Closeout,

1.03 QUALITY ASSURANCE

- A. Prior to requesting inspection by the Engineer, use adequate means to assure that the Work is substantially completed in accordance with the specified requirements, and is ready for the requested inspection.
- B. Substantial completion date for the Contract shall be established as stated in the General Conditions.

1.04 PROCEDURES

- A. Substantial Completion:
 - 1. Substantial completion is defined as that point at which the facilities are basically complete to the AUTHORITY's satisfaction in accordance with Document 007000 – General Conditions, Article 1, Definitions. All mechanical and life safety features shall have been installed, and be functionally operational. Remaining work shall be extremely minor or require seasonal opportunity to complete or subject to delayed completion items, and shall not impair the functionality or health and life safety features of the facilities.

2. The Contractor shall notify the Engineer in writing a minimum of 14 days prior to the date when the work will be substantially completed and ready for inspection.
 3. Within a reasonable time after receipt of such notice, the Engineer will inspect to determine status of completion.
 4. Should the Engineer determine that the work is not substantially complete:
 - a. The Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. The Contractor shall remedy the deficiencies and notify the Engineer when ready for reinspection.
 - c. The Engineer will reinspect the work.
 - d. The Contractor shall be liable for expenses incurred by the AUTHORITY and Engineer for reason of such Substantial Completion Reinspection.
 5. When the Engineer concurs that the work is substantially complete:
 - a. The Engineer will prepare a "Memorandum of Acceptance", accompanied by a Substantial Completion Punch List of items to be completed or corrected, as verified by the Engineer.
 - b. The Engineer will submit the Memorandum to the AUTHORITY and to the Contractor for their written acceptance of the responsibilities assigned to them in the Memorandum.
 - c. Once the Contractor executes the Memorandum, it must be returned to the Engineer.
- B. Final Inspection:
1. Final Inspection shall be defined as that period at which all Work in the Contract is 100% complete and no minor details remain to be performed in accordance with Document 007000 – General Conditions, Article 1, Definitions.
 2. Final Inspection shall not be made until all Work under the contract is completed in accordance with Section 017700 – Contract Closeout.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 00

CLEANING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. During the term of this Contract, the Contractor shall remove as promptly as possible any materials and equipment which are not required for the completion of the Work. All debris shall be removed from the site and legally disposed of. The Contractor shall take particular care to eliminate any hazards created by his operations.
- B. Related Sections:
 - 1. Documents affecting Work of this section include, but are not necessarily limited to: General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this section, comply with requirements for cleaning as described in other pertinent sections of these Specifications.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.
- B. Materials used for cleaning shall not harm the existing vegetative mat of the tundra.

PART 3 - EXECUTION

3.01 PROGRESS CLEANING

- A. At the completion of the project, or prior thereto if so directed by the Engineer, the Contractor shall be responsible for complete cleaning of those portions of the project, which his work affects.
 - 1. Contractor shall remove from the facility all tools, equipment, surplus materials, debris, temporary structures, and other material not incorporated in the permanent installation.

B. Restoration of Damaged Property

To the extent that any roads, boardwalks, vegetation, structures, utilities or other items are damaged or displaced by the Contractor's operations, these shall be restored to their original or better condition prior to Substantial Completion. This shall include both on-site and off-site items. Any damage which is severe enough to disrupt community travel or utilities shall be repaired by the Contractor immediately.

C. Cleaning, repair, and restoration must be accomplished prior to Final Inspection, to the satisfaction of and at no additional cost to the AUTHORITY.

END OF SECTION

SECTION 01 72 00

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Maintenance of Record Documents and Samples.
- B. Submittal of Record Documents and Samples.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraph 6.16 – Record Documents.
- B. Section 013000 – Submittals.
- C. Section 017700 – Contract Closeout.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. In addition to requirements in General Conditions, maintain at the site for AUTHORITY one accurate record copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and samples.
 - 6. Field records.
 - 7. Field test records.
 - 8. Inspection certificates.
- B. Prior to Substantial Completion, provide original or legible copies of each item maintained by CONTRACTOR as listed in 1.03.A above.
- C. Delegate responsibility for maintenance of Record Documents to one person on CONTRACTOR's staff.
- D. Promptly following award of Contract, secure from AUTHORITY, at no cost to the CONTRACTOR, one (1) complete set of all Documents comprising the Contract.
- E. Immediately upon receipt of job set described above, identify each Document with title "RECORD DOCUMENTS – JOB SET".
- F. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples.

- G. Label and file record documents and samples in accordance with section number listings in table of contents of this Project manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- H. Maintain record documents in a clean, dry and legible condition. Do not use record documents for construction purposes.
- I. Use all means necessary to maintain job set of Record Documents completely protected from deterioration and from loss and damage until completion of Work and transfer of recorded data to AUTHORITY.
- J. Keep record documents and samples available for inspection by AUTHORITY.
- K. Upon request by the AUTHORITY and at time of each Application for Payment, submit complete collection of record documents to the AUTHORITY for review and duplication as desired.
- L. AUTHORITY's approval of current status of Record Documents will be prerequisite to AUTHORITY's approval of requests for progress payments and request for final payment.
 - 1. Prior to submitting each request for progress payment, secure AUTHORITY's approval of Record Documents as currently maintained.
 - 2. Prior to submitting request for Final Payment, obtain AUTHORITY's approval of final Record Documents.
- M. Do not use job set for any purpose except entry of new data and for review and copying by AUTHORITY.

1.04 RECORDING

- A. Record information on a set of black line opaque Drawings, and in a copy of a Project manual, provided by AUTHORITY.
- B. Using felt tip marking pens, ballpoint pens, or colored pencil, maintaining separate colors for each major system, clearly describe changes by note and by graphic line, as required. Date all entries. Call attention to entry by a "cloud" around area or areas affected.
- C. Thoroughly coordinate all changes within Record Documents, making adequate and proper entries on each Specification Section and each sheet of Drawings and other Documents where such entry is required to properly show change or selection.
- D. When a change within Record Documents is referenced to another document, such as Design Clarification Request, Shop Drawing, or Change Order, attach a copy of the referenced document to the respective Record Drawing or Record Specification where the entry is made.

- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Accurate to the nearest inch.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by modifications.
 - 5. Details not on original Contract Drawings.
 - 6. References to related Shop Drawings and modifications.
 - 7. Clearly label all changes and show dimensions to establish size and location. All identifications shall be sufficiently descriptive to relate reliably to Specifications.

- F. Specifications: Legibly mark each item to record actual construction, including:
 - 1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
 - 2. Changes made by Addenda and modifications.

- G. Other Documents: Maintain manufacturer's certifications, inspection certifications, and field test records required by individual Specifications sections.

1.05 SUBMITTALS

- A. Upon submittal of the completed Record Documents, make changes in Record Documents as required by the AUTHORITY.

- B. Transmit Record Documents, with cover letter in duplicate, listing:
 - 1. Date.
 - 2. AUTHORITY's Project title and number.
 - 3. CONTRACTOR's name, address, and telephone number.
 - 4. Number and title of each record document.
 - 5. Signature of CONTRACTOR or authorized representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Procedures to be followed in closing out the Contract.

1.02 RELATED SECTIONS

- A. Document 007000 – General Conditions, Paragraphs 13.14, 13.15 and 13.17 for Final Payment, Final Acceptance, and Waiver of Claims by Contractor.
- B. Document 007000 – General Conditions.
- D. Section 017000 - Project Closeout
- C, Section 017100 – Cleaning

1.03 SUBSTANTIAL COMPLETION

- A. Substantial completion date for the Contract shall be established as stated in the General Conditions.

1.04 FINAL SUBMITTALS

- A. No Contract will be finalized until all of the following have been submitted as required in Section 013000 – Submittals:
 - 1. Submittals.
 - 2. Operation and Maintenance manuals.
 - 3. Project Record Documents.
 - 4. Application for Final Payment.
- B. No Contract will be finalized until all warranties and guarantees, bonds, certifications, licenses, affidavits, evidence of payment of Subcontracts and suppliers, and certificate of release required for work or equipment as specified are satisfactorily filed with the Engineer and AUTHORITY.

1.05 RELEASE OF LIENS OR CLAIMS

- A. No Contract will be finalized until satisfactory evidence of release of liens has been submitted to AUTHORITY as required by the General Conditions.

1.06 WARRANTIES AND GUARANTEES

- 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 AUTHORITY, 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 warranties 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 AUTHORITY 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 AUTHORITY, and without expense to the AUTHORITY, 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 AUTHORITY 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.

1.07 STATEMENT OF ADJUSTMENT TO ACCOUNTS

- A. With the request for final payment, submit final statement reflecting adjustments to Contract Price indicating:
 - 1. Original Contract Price.
 - 2. Previous Change Orders.
 - 3. Changes under allowances.
 - 4. Changes under Unit Prices.
 - 5. Deductions for uncorrected Work.
 - 6. Penalties and bonuses.
 - 7. Deductions for liquidated damages.
 - 8. Deductions for reinspection fees.
 - 9. Other adjustments to Contract Price.
 - 10. Total Contract Price as adjusted.
 - 11. Previous payments.
 - 12. Sum remaining due.
- B. AUTHORITY will issue a final Change Order reflecting all remaining adjustments to Contract Price not previously made by Change Orders.

PART 2 - PRODUCTS

2.01 SURPLUS MATERIALS

- A. Contractor shall furnish to the AUTHORITY upon acceptance of work all surplus materials specified to be provided for this project.
- B. Surplus materials must be in like new condition and be provided in the original manufacturers packaging.

PART 3 - EXECUTION

3.01 FINAL CLEANING

- A. At completion of Work and immediately prior to final inspection, clean entire project according to the following provisions and Section 017100 – Cleaning:
 - 1. Clean, sweep, wash, and polish work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the Engineer and AUTHORITY.
 - 2. Should Contractor not remove rubbish or debris, or not clean the facilities and site as specified above, the AUTHORITY reserves the right to have final cleaning done at the sole expense of the Contractor.
- B. The Contractor shall:
 - 1. Employ experienced workers or professional cleaners for final cleaning.
 - 2. Conduct final inspection of exposed interior and exterior surfaces and of concealed spaces in preparation for substantial completion or occupancy.
 - 3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from exposed interior and exterior finished surfaces; polish surfaces designated to shine finish.
 - 4. Repair, patch, and touch up marred surfaces to specified finish, and match adjacent surfaces.
 - 5. Broom clean paved surfaces; rake clean other surfaces.
 - 6. Remove debris accumulated within the project area, around the access roads, boardwalks and temporary storage areas.
 - 7. Remove all abovegrade survey debris, including lathe, staking and flagging.
 - 8. Remove from the construction site and Contractor's staging area temporary structures and materials, equipment, and appurtenances not required as part of, or appurtenant to, the completed work. See Section 015000 – Temporary Facilities and Controls.
 - 9. Leave water courses, gutters, and ditches open and in condition satisfactory to Engineer.
- C. The Facility Owner or the respective participant will assume responsibility for cleaning as of the date of Final Completion.

3.02 FINAL INSPECTION –

- A. Following notification, the Engineer or a representative of the AUTHORITY, will make a final inspection of the Contractor's work and record any deficiencies on the Final Inspection Punch List. The Contractor shall immediately correct these deficiencies at his own expense and notify the Engineer in writing when all items have been corrected. The Engineer or a representative of the AUTHORITY may reinspect the work to assure correction of all deficiencies. The Contractor shall be liable for all costs of reinspection when the Substantial Completion Punch List deficiencies have not been corrected at the time of the Final Inspection and additional reinspection is required.
- B. Any reasonable delay by the AUTHORITY in making Final Inspection shall not relieve the Contractor of responsibility for the Work, nor shall the AUTHORITY be held responsible for damages or claims for compensation on account of continuing overhead, maintenance, etc., occasioned by such a delay.
- C. When the Engineer finds all Work satisfactory, Contractor will be allowed to make application for final payment in accordance with provisions of the General Conditions. Should Engineer still find deficiencies in the Work, Engineer will notify Contractor in writing of deficiencies and will not approve Contractor's request for final payment until such time as Contractor has satisfactorily completed the required Work.

END OF SECTION

SECTION 01 80 00

INCIDENTAL WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The following items shall be considered incidental to performing the work and no separate payment shall be made:
1. Safe handling and disposal of fuel, oil, paint and thinners, and other hazardous material.
 2. Safety program to protect workers and residents.
 3. Sanitation facilities for workers.
 4. Post-construction cleanup.
 5. Climate controls for painting, such as tenting and heaters.
 6. Disposal and hauling of unsuitable materials removed from excavations.
 7. Protection of materials and work from weather during construction.
 8. Snow removal.
 9. Provisions for temporary fueling or fuel transfers.
 10. Temporary mats or fills required to support heavy equipment.
 11. Construction of ice / snow roads.
 12. Temporary removal / replacement of boardwalks or other structures that interfere with the work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete requirements.

1.02 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- C. ACI 305 - Hot Weather Concreting.
- D. ACI 306R - Cold Weather Concreting.
- E. ACI 318 - Building Code Requirements for Reinforced Concrete.
- F. ASTM C33 - Concrete Aggregates.
- G. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.
- H. ASTM C94 - Ready-Mixed Concrete.
- I. ASTM C143 - Test for Slump of Portland Cement Concrete.
- J. ASTM C150 - Portland Cement.
- K. ASTM C192 - Making and Curing Concrete Test Specimens in the Laboratory.
- L. ASTM C260 - Air Entraining Admixtures for Concrete.
- M. ASTM C494 - Chemical Admixtures for Concrete.
- N. ASTM D4397 - Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

1.03 SUBMITTALS

- A. Product Data

Air-entraining admixture

- B. Miscellaneous

Mix design: Submit proposed mix design for review prior to commencement of Work, including delivery of concrete components. The mix design shall be newly prepared for the specific components intended for use in the project.

Submit results of cylinder breaks, entrained air test, and slump tests.

Accurately record actual locations of embedded utilities and components which are concealed from view. Submit under provisions of Section 017000.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Maintain one copy of each document on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to ACI 305 when concreting during hot weather.
- E. Conform to ACI 306R when concreting during cold weather.

1.05 COORDINATION

- A. Coordinate the placement of threaded rods with tank and module skids.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Super Sacked Portland Cement: ASTM C150, Type I or II.
- B. Coarse Aggregate: ASTM C33, Grade 67.
- C. Intermediate Aggregate: ASTM C33, Grade 8
- D. Fine Aggregate: ASTM C33, Concrete sand.
- E. Mixing Water: Fresh, clean, and potable.
- F. Air-Entraining Admixture: ASTM C260, MB AE-90 or approved equal.

2.02 MIX DESIGN

- A. The Contractor shall furnish all aggregate for cast-in-place concrete and a material sample shall be submitted to ensure compliance with the specifications.
- B. The design of the concrete mixes using the materials specified shall be the responsibility of the Contractor in accordance with ASTM requirements. The concrete shall be Type C and have the following characteristics:

Compressive strength at 28 days shall be not less than 3,000 psi.

The strength of the concrete proposed for use shall be established by testing prior to beginning concreting operation. A test consists of the average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.

Slump shall not be more than 4 inches for vibrated concrete tested in accordance with ASTM C143.

Minimum cement factor shall be 5.5 bags per cubic yard.

Air-entrainment is required for all concrete and shall be 6 percent +/- 1-1/2 percent.

Maximum water-to-cement ratio shall not exceed 0.45, consistent with ACI recommendations for minimum shrink concrete.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, bar chairs, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, and positioned securely.

3.02 MIXING

- A. Materials shall be stored, batched, and mixed as specified in ASTM C94.

Hand-Mixed: Hand-mixed concrete will be permitted in amounts less than or equal to one sack of cement per batch. Proportions for concrete shall be in accordance with the approved mix design. Accomplish mixing in a manner to obtain required consistency and strength.

3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301, ACI 304, and ACI 318.
- B. Notify Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, and other accessories are not disturbed during concrete placement.
- D. Composite slab, provide closures necessary to contain the concrete during the pour.
- E. Do not interrupt successive placement; do not permit cold joints to occur within the foundations.

3.04 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.

3.05 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures in accordance with ACI 305 and ACI 306, and mechanical injury. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening of concrete and minimizing of shrinking cracks.
- C. Impervious Sheeting: Except during cold weather concreting, wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with

impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges.

3.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. Three concrete test cylinders will be taken for every 75 or less cubic yards of concrete placed on each day.
- E. One additional test cylinder will be taken during cold weather concreting as defined by ACI 305, and cured on job site under same conditions as concrete it represents.
- F. One test cylinder shall be tested for compressive strength at 7 days and two cylinders shall be tested for compressive strength at 28 days. If an additional cylinder was cast during cold weather concreting, it shall be tested for compressive strength at 28 days.
- G. One slump test and entrained air test will be taken for each set of test cylinders taken.

3.07 PATCHING

- A. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- B. Patch imperfections in accordance with ACI 301.

3.08 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Engineer.
- C. Contractor shall repair or replace defective concrete as directed at no additional cost to the Owner.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A.** This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
 - 1.** Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
 - 2.** This section applies, but is not limited to Tank Containment and Foundation Structures, stairways, pump boxes, and other miscellaneous steel fabrications.

1.2 RELATED REQUIREMENTS

- A.** Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B.** Section 06 1000 - Rough Carpentry
- C.** Section 06 17 50 – Metal Plate Connected Wood Trusses
- D.** Section 07 2100 - Building Insulation
- E.** Section 07 4213 - Metal Wall Panels
- F.** Section 09 9000 Painting and Coatings
- G.** Section 13 3419 - Pre-Engineered Buildings

1.3 SUBMITTALS

- A.** General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B.** Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 1.** Structural steel, including certified copies of mill reports covering chemical and physical properties.
 - 2.** Structural steel coating system.
- C.** Shop drawings including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 - 1.** Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

- D. Welders' certifications.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following (latest addition), except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. AISC "Specifications for Structural Steel Buildings," including "Commentary."
 - 3. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
 - 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 - 2. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-lubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. At Contractor's expense, repair or replace damaged materials or structures as directed.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

- B.** Structural Steel Shapes, Plates, and Bars: ASTM A 36, 50 ksi material is acceptable for structural shapes, if more readily available.
- C.** Steel Tubing: ASTM A 500, cold-formed steel tubing
- D.** Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads
- E.** Grip Strut stair treads and landings shall be hot dip galvanized, and shall have serrated edges around diamond shaped openings to provide slip resistance. 5-Diamond plank x 11 $\frac{3}{4}$ " wide x 2" thick, 12 gauge galvanized. Install per manufacturers recommendations
- F.** Unfinished Threaded Fasteners: ASTM A 325, high strength bolts.
 - 1.** Provide hexagonal heads and nuts for all connections.
- G.** Electrodes for Welding: Comply with AWS Code.

2.2 FABRICATION

- A.** Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
 - 1.** Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 - 2.** Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B.** Connections: Weld or bolt shop connections, as indicated.
- C.** Bolt field connections, except where welded connections or other connections are indicated. Use ASTM A 325, Type 3, corrosion resistant bolts.
- D.** Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E.** Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- F.** Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- G.** Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 STEEL COATING

- A.** Coat miscellaneous steel structures in accordance with Section 09 9000 Painting and Coatings, unless otherwise noted on Contract Drawings or Specifications as galvanized.

- B.** Hot-dip Galvanizing: Galvanize all structural steel shapes, plates, bolts and hardware where specified in the Contract Drawings in accordance with Section 09 9700, ASTM A 123, and ASTM A 153. This includes, but is not limited to the following: handrails; bolts; fasteners; grip strut; bar grate; pipe supports, clamps, and hardware; gate and fence components; ladders; and catwalks.

2.4 SOURCE QUALITY CONTROL

- A.** General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 1.** At Contractor's expense, promptly remove and replace materials or fabricated components that do not comply.
- B.** Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 - 1.** Promptly notify Project Manager whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 – EXECUTION

3.1 ERECTION

- A.** Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- B.** Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- C.** Level and plumb individual members of structure within specified AISC tolerances.
- D.** Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Project Manager. Finish gas-cut sections equal to a sheared appearance when permitted.
- E.** Touch-Up Repairs: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint or galvanizing.
 - 1.** Galvanizing Repair: Galvanized coating at damaged areas shall be repaired according to ASTM A 780 (Annex A1) using zinc-based alloy repair sticks commonly known as "hot sticks".

2. Coating Repair: If underlying metal surface is exposed, wheel abrade or sandblast to clean metal and re-coat same as tanks. If damage does not fully penetrate coating, then reapply top coat only to minimum DFT.

3.2 QUALITY CONTROL

- A.** AVEC or AVEC's representatives will visually inspect welded connections.
- B.** AVEC reserves the right to contract an independent testing firm to test welded connections.
- C.** Provide access for AVEC inspectors or testing agency representatives to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D.** AVEC may inspect structural steel at plant before shipment.
- E.** Correct deficiencies in structural steel work that inspection and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- F.** Shop Welding: Contractor shall inspect and test during fabrication of structural steel assemblies, as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all welds.
 3. Perform tests of full penetration welds as follows.
 - a. Ultrasonic Inspection: ASTM E 164.
- G.** Field Welding: Contractor shall inspect and test during erection of structural steel as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all welds.
 3. Perform tests of full penetration welds as follows:
 - a. Ultrasonic Inspection: ASTM E 164.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Wood furring, grounds, nailers, and blocking.
 - 3. Sheathing.
 - 4. Fasteners and metal framing anchors.

1.02 RELATED SECTIONS

- A. Section 061750 Metal Plate Connected Wood Trusses
- B. Section 074113 Metal Roof Panels

1.03 REFERENCES

- A. American Forest and Paper Association (AFPA) Manual for Wood Frame Construction
- B. American National Standards Institute (ANSI)
 - A208.1 Mat-Formed Manufactured Panels
- C. Engineered Wood Association
 - Form E30 Engineered Wood Design/Construction Guide
- D. American Society of Mechanical Engineers (ASME)
 - B18.2.1 Square and Hex Bolts and Screws (Inch Series)
 - B18.6.1 Wood Screws (Inch Series)
- E. American Society for Testing and Materials (ASTM)
 - A153 Specification for Zinc-Coating (Hot-Dip of Iron and Steel Hardware)
 - A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - A563 Specification for Carbon and Alloy Steel Nuts

- A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- D245 Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber
- D2555 Test Method for Establishing Clear Wood Strength Values
- F. American Wood Preservers Association (AWPA)
 - C2 Lumber, Pressure Treatment
 - C9 Plywood, Pressure Treatment
 - C20 Structural Lumber, Fire-Retardant Pressure Treatment
 - C27 Plywood, Fire-Retardant Pressure Treatment
 - M4 Standard for the Care of Preservative-Treated Wood Products
- G. Federal Specification (FS)
 - FF-N-105B Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
- H. International Conference of Building Officials (ICBO)
 - International Building Code (IBC) Chapter 23 Wood
- I. U.S. Department of Commerce, National Institute of Standards and Technology
 - PS 1 US Product Standard for Construction and Industrial Plywood
 - PS 2 Performance Standard for Wood-Based Structural-Use Panels
 - PS 20 American Softwood Lumber Standard (ASLS)

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each distinct product specified.
- B. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use, and design values approved by American Lumber Standards Committee's (ALSC) Board of Review.
- C. Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, and finishing treated materials:

1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by single producer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.
- B. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings.
- C. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
- D. Protect sheet materials during handling to prevent breaking of corners and damage to surfaces.

PART 2 – PRODUCTS

2.01 LUMBER, GENERAL

- A. Lumber Standards: Comply with PS 20-99, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review. Lumber design values are to comply with ASTM D245 and ASTM D2555.
- B. Inspection Agencies: Inspection agencies, and their grading rules include the following:
 1. West Coast Lumber Inspection Bureau (WCLIB)
 2. No. 17 Standard Grading Rules for West Coast Lumber

3. Western Wood Products Association (WWPA)
 4. Western Lumber Grading Rules
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
- E. Where nominal sizes are indicated, provide actual sizes required by PS 20-99 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
1. Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.
 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38 mm actual) thickness or less, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with Quality Mark Requirements of inspection agency approved by ALSC's Board of Review.
- B. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- C. Pressure treat aboveground items with waterborne preservatives to minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m.). After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing members less than 18 inches (460 mm) above grade.
 4. Wood floor plates installed over concrete slabs directly in contact with earth.

- D. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.60 lb/cu. ft.
- E. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPAC M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPAC C20 (lumber) and AWPAC C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of Underwriter Laboratory (UL), U.S. Testing, or Timber Products Inspection, Inc.
- B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
 - 1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested.
 - 2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
 - 3. Contact with treated wood does not promote corrosion of metal fasteners.
- C. Exterior Type: Use for exterior locations, and where indicated.
- D. Inspect each piece of treated lumber or plywood after drying, and discard damaged or defective pieces.

2.04 DIMENSION LUMBER

- A. All lumber to equal No. 2 Douglas Fir, or better.

2.05 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on Contract documents.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade and Species: For dimension lumber sizes, provide No. 2, or better Douglas Fir.

2.06 FASTENERS

- A. General: Provide fasteners of size and type indicated, that comply with requirements specified.

- B. Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A153
- C. Nails, Wire, Brads, and Staples: ASTM F1667
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A307, Grade A with ASTM A563 hex nuts and, where indicated, flat washers.

2.07 METAL FRAMING ANCHORS

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated, with allowable design loads as published by manufacturer, that meet or exceed those indicated.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

PART 3 – EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with IBC Table 2304.9.1 Fastening Schedule.

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown, and where required for attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

3.03 WOOD FURRING

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Firestop furred spaces of walls at each floor level, and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

3.04 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Install framing members of size and at spacing indicated.
- C. Do not splice structural members between supports.
- D. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal (38 mm actual) thickness lumber of same width as framing members.
- E. Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel.
 - 1. Provide single bottom plate and double top plates using members of 2-inch nominal (38 mm actual) thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.
 - 2. For exterior walls, provide 2 by 6-inch nominal (38 by 140 mm actual) size wood studs spaced 24 inches (610 mm) o.c., except where otherwise indicated or required.
- F. Construct corners and intersections with three (3) or more studs. Provide miscellaneous blocking and framing as shown, and as required to support facing materials, fixtures, specialty items, and trim.
- G. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.
 - 1. For load-bearing walls, provide double-jamb studs for openings 72 inches (1.8 m) and less in width, and triple-jamb studs for wider openings. Provide headers of depth shown as indicated on Contract documents.

PART 4 - BASIS OF MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT

- A. There is no measurement for this item.

4.02 BASIS OF PAYMENT

- A. All costs associated with this item shall be subsidiary to Additive Alternate B – Construct Standby Power Module and no separate payment shall be made for the requirements of this section.

END OF SECTION

SECTION 06 13 00

TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section applies to construction using timbers including, but not limited to, above ground pipe supports, tank supports, and timber foundation systems where shown on the drawings.

Related Sections include the following:

- 1. Division 06 10 00 Section "Rough Carpentry."

1.3 DEFINITIONS

- A. Timbers: Lumber of 3 inches nominal or greater in least dimension.
- B. Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. WCLIB - West Coast Lumber Inspection Bureau.
 - 4. WWPA - Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Schedule delivery of heavy timber construction to avoid extended on-site storage and to avoid delaying the Work.
- B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 TIMBER, GENERAL

- A. General: Comply with DOC PS 20 and grading rules of lumber grading agencies certified by American Lumber Standards Committee Board of Review, as applicable
 1. Factory mark each item of timber with grade stamp of grading agency.
 2. Provide dressed timber, S4S, unless otherwise indicated.
- B. Preservative Treatment:
 1. Pressure treatment in accordance with AWPA standard C22, 0.60 minimum retention, rated for ground contact.
 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
 - a. Copper Azole – Type A (CBA-A).
 - b. Ammoniacal copper zinc arsenate (ACZA).
 3. Use process that includes water-repellent treatment.
 4. Application: Treat all timber construction, unless otherwise indicated.
- C. Timber Species and Grade: Hem-fir or hem-fir (North); No. 2 or better, NLGA, WCLIB, or WWPA.

2.2 TIMBER CONNECTORS

- A. Fabricate tie rods from galvanized round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.

- B. Fasteners: Stainless steel fasteners shall be provided for connections in all pressure-treated wood, unless the following requirements` are met:
 - 1. Approval letters are submitted from both the wood treatment manufacturer and the fastener manufacturer, stating the proposed fasteners are suitable for permanent installations in exterior, exposed, wet locations.
 - 2. Steel fasteners, if approved shall be as a minimum ASTM A307 lags or bolts with a triple plate galvanized finish of an equivalent thickness to G185.
- C. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent. Galvanized fasteners and assemblies do NOT require seal coating.

2.3 WOOD PRESERVATIVE

- A. Chemical solution for the treatment of field cuts and bore holes in accordance with the requirements of AWPA standard M4.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
- B. Fit members by cutting and restoring exposed surfaces to match specified surfacing. Pre-drill for fasteners and assembly of units.
- C. Install timber connectors as indicated.
 - 1. Unless otherwise indicated, install lag bolts with same orientation within each connection and in similar connections.
 - 2. Pre-drill lead holes for lag screws:
 - a. The clearance hole for the shank shall have the same diameter as the shank, and the same depth of penetration as the length of unthreaded shank. Shank clearance hole shall be increased as required for countersinking.
 - b. The lead hole for the threaded portion shall have a diameter equal to 40% to 70% of the shank diameter and a length equal to at least the length of the threaded portion.
 - c. The threaded portion of the lag screw shall be inserted in its lead

hole by turning with a wrench, not by driving with a hammer.

- d. Soap or other lubricant shall be used on the lag screws or in the lead holes to facilitate insertion and prevent damage to the lag screw.
- D. Field treat all cuts and bore holes in accordance with AWPA standard M4.

3.2 ADJUSTING AND CLEANING

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Project Manager.

END OF SECTION

SECTION 06 17 50

METAL-PLATE-CONNECTED WOOD TRUSSES

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Wood roof trusses.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.

1.03 SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
5. Show splice details and bearing details.
6. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Qualification Data: For metal-plate manufacturer, professional engineer, and fabricator.

D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Metal-plate connectors.
2. Metal truss accessories.

1.04 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
- E. Forest Certification: Provide metal-plate-connected wood trusses produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

PART 2 – PRODUCTS

2.01 DIMENSION LUMBER

- A. Lumber: DOC PS 20. Provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

- B. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
- C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 6 Section Rough Carpentry.

2.02 METAL PRODUCTS

- A. Connector Plates: Fabricate connector plates to comply with TPI 1 from hot-dip galvanized steel sheet complying with ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alpine Engineered Products, Inc.
 - b. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 - c. CompuTrus, Inc.
 - d. Eagle Metal Products.
 - e. Jager Building Systems, Inc.
 - f. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 - g. Robbins Engineering, Inc.
 - h. TEE-LOK Corporation; a subsidiary of Berkshire Hathaway Inc.
 - i. Truswal Systems Corporation.
- B. Fasteners: Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 1. Nails, Brads, and Staples: ASTM F 1667.
 - 2. Power-Driven Fasteners: NES NER-272.
 - 3. Wood Screws: ASME B18.6.1.

4. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
 5. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- C. Metal Truss Accessories: Provide truss accessories made from hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 3. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or designation or comparable products by one of the following:
 - a. Cleveland Steel Specialty Co.
 - b. Harlen Metal Products, Inc.
 - c. KC Metals Products, Inc.
 - d. Simpson Strong-Tie Co., Inc.
 - e. Southeastern Metals Manufacturing Co., Inc.
 - f. USP Structural Connectors.
 4. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those **indicated**. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.03 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Division 6 Section Rough Carpentry.
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not cut or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.

PART 4 - BASIS OF MEASUREMENT AND PAYMENT

4.01 BASIS OF MEASUREMENT

- A. There is no measurement for this item.

4.02 BASIS OF PAYMENT

- A. All costs associated with this item shall be subsidiary to Additive Alternate B – Construct Standby Power Module and no separate payment shall be made for the requirements of this section.

END OF SECTION

SECTION 07 12 00
BUILDING INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide thermal insulation.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Board Insulation:
1. Manufacturer: CertainTeed Corp., Insulation Group; Hunter Panels; envelope; Knauf Insulation; Polymaster, Inc.; Dow; Owens Corning
- B. Blanket/Batt Insulation:
1. Manufacturer: Knauf Insulation; Thermafiber, Inc.; Thermal Design; Johns Manville; Owens Corning
 2. Application: Thermal insulation between trusses at roof.
 3. Type: Fiberglass batt or roll insulation
- C. Spray-Applied Polyurethane Insulation Continuously foamed-in-place, zero ODP and zero VOC closed cell polyurethane, 2.1 pounds per cubic foot nominal density, 20.6 psi compressive strength, 45.4 psi tensile and adhesion strength. Heatlok soy-200, or equal. Factory Mutual Class 1 approval.
1. Application: Under Floor – 3” minimum.
- D. Encapsulate insulation with high elongation polyuria coating, 100% solids by weight and volume, 2500 psi shear and tensile strength, 720% elongation, -60F to 300F service temperature, Polyshield HI_E or equal, color medium grey.

1. Application: Under Floor – 60 mil minimum thickness continuous coverage over insulation.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide full thickness in one layer over entire area, tightly fitting around penetrations.
- B. Protect installed insulation.

END OF SECTION

SECTION 07 41 13

FORMED METAL ROOF PANELS (STANDING SEAM)

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal roof panels.
- B. Flashing and trim integral to roof panels.
- C. Clips, anchoring devices, fasteners, and accessories for installation of panel system.

1.2 RELATED REQUIREMENTS

- A. Section 01 33 00 – Submittal Procedures.
- B. Section 01 45 00 – Quality Control.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Product Literature and data sheets for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.
 - 3. Calculations demonstrating attachment complies with

1.4 REFERENCE STANDARDS

- A. UL 580 - Uplift Resistance of Roof Assemblies.
- B. UL 1897 - Uplift Test for Roof Covering Systems.
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A 792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process.
- E. ASTM A 924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

1.5 PERFORMANCE REQUIREMENTS

A. Structural and Wind Load Tests:

1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/240.
2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.
3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7 foot purlin spacing and 166 psf when tested on 5 foot purlin spacing.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty year limited warranty on paint finish for adhesion to the substrate and a thirty year limited warranty on chalk and color fade.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span, A Division of ASC Profiles Inc. - A BlueScope Steel Company, 2110 Enterprise Boulevard, West Sacramento, CA 95691, 800-726-2727, 916-372-0933 (Corporate Office) 907-227-1607 (Alaska Office) or approved equal.

2.2 MATERIALS

- A. Standing Seam Metal Roof Panels: AEP Klip-Rib, or approved equal.
1. Prefinished Galvalume® or Zinalume® sheet, ASTM AZ50 made of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792.
 2. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 3. Fabricated panel with integral continuous overlapping seams suitable for continuous locking or crimping by mechanical means during installation.
 4. Seam Height: 1 5/8" high ribs @ 8" centers.
 5. Provide pre-installed, high grade, hot-melt elastomeric sealant or butyl mastic, within the confines of panel's female leg, designed to seal against adjacent male panel leg.
 6. Thickness: 24 gauge (0.0250 inch).
- B. Panel Finish:
1. Exterior Finish: Cool Dura Tech 5000, color cool Forest Green.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Clips, anchoring devices, fasteners, and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.
- F. Provide Compatible Snow Fencing system as shown on the drawings.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick. Grace Ice and Water Shield, or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
 - 1. Overall rake to rake tolerances plus or minus 2 inches or plus or minus 1 inch at each rake.
 - 2. Overall eave to ridge tolerance plus or minus 1 inch or plus or minus 1/2 inch at the eave, end lap and ridge.
 - 3. Vertical deviation from the nominal roof plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length and plus or minus 1/2 inch over the entire roof area.
- C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- D. Correct defective conditions before beginning work.
- E. If substrate is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using clips and fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- D. Install flashing and trim true and in proper alignment.

- E. Protective film on trim shall be removed before exposure to sunlight.
- F. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight

3.4 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 42 13

FORMED METAL WALL PANELS (SIDING FOR ROOF GABLES & FASCIA)

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal wall panels.
- B. Flashing and trim integral to wall panels.
- C. Fasteners and accessories for installation of panel system.

1.2 RELATED REQUIREMENTS

- A. Section 01 33 00 – Submittal Procedures.
- B. Section 01 45 00 – Quality Control.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Product Literature for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.

1.4 REFERENCE STANDARDS

- A. UL 580 - Uplift Resistance of Roof Assemblies
- B. UL 1897 - Uplift Test for Roof Covering Systems
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A 792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process.
- E. ASTM A 924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.5 PERFORMANCE REQUIREMENTS

- A. Structural and Wind Load Tests:
 - 1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load

- with a deflection limit of L/240.
- 2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.
- 3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7 foot purlin spacing and 166 psf when tested on 5 foot purlin spacing.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty year limited warranty on paint finish for adhesion to the substrate and a thirty year limited warranty on chalk and color fade.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span, A Division of ASC Profiles Inc. - A BlueScope Steel Company, 2110 Enterprise Boulevard, West Sacramento, CA 95691, 800-726-2727, 916-372-0933 (Corporate Office) 907-227-1607 (Alaska Office) or approved equal.

2.2 MATERIALS

- A. Metal Wall Panels: AEP Super-Span, or approved equal.

1. Prefinished Galvalume® or Zinalume® sheet, ASTM AZ50 made of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792.
 2. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 3. Fabricated panel with integral continuous overlapping seams.
 4. Seam Height: 1-1/4" high.
 5. Provide pre-installed, high grade, hot-melt elastomeric sealant or butyl mastic, within the confines of panel's female leg, designed to seal against adjacent male panel leg.
 6. Thickness: 24 gauge (0.0250 inch).
- B. Panel Finish:
1. Exterior Finish: One coat 70 percent polyvinylidene fluoride, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer; color Cool Forest Green.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Fasteners and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
1. Overall rake to rake tolerances plus or minus 2 inches or plus or minus 1 inch at each rake.
 2. Vertical deviation from the nominal wall plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length and plus or minus 1/2 inch over the entire wall area.
- C. Verify wall openings, curbs, pipes, sleeves, ducts, or vents through wall are solidly set, reglets are in place, and nailing strips located.
- D. Correct defective conditions before beginning work.
- E. If substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- D. Install flashing and trim true and in proper alignment.
- E. Protective film on trim shall be removed before exposure to sunlight.
- F. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight

3.3 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 42 14

INSULATED METAL WALL PANELS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A.** Insulated metal wall panels.
- B.** Flashing and trim integral to insulated panels.
- C.** Clips, anchoring devices, fasteners, and accessories for installation of panel system.

1.2 RELATED REQUIREMENTS

- A.** Section 05 1200 - Structural Steel
- B.** Section 05 4000 - Cold Formed Metal Framing
- C.** Section 07 2100 - Building Insulation
- D.** Section 07 4113 - Insulated Metal Roof Panels
- G.** Section 09 9000 - Painting
- H.** Section 13 3419 - Pre-Engineered Buildings

1.3 REFERENCES

- A.** NFPA 259 - Test Method for Potential Heat of Building Materials
- B.** NFPA 285 - Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies
- C.** NFPA 286 - Fire Test of Evaluating Conditions of Wall and Ceiling Finish to Roof Fire Growth
- D.** AAMA 501.1 - Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.
- E.** Factory Mutual Research Corporation (FMRC) Standard 4880 - Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, and

Interior or Exterior Finish Systems.

- F.** Factory Mutual Research Corporation (FMRC) Standard 4881 - Standard for Class Exterior Wall Systems.
- G.** ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- H.** ASTM A 792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process
- I.** ASTM A 924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- J.** ASTM C 273 - Shear Properties of Sandwich Core Materials
- K.** ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- L.** ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics
- M.** ASTM D 1622 - Apparent Density of Rigid Cellular Plastics
- N.** ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
- O.** ASTM E 18 - Test Methods for Rockwell Hardness of Metallic Finishes
- P.** ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- Q.** ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- R.** ASTM E 90-99 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- S.** ASTM E 283 - Standard Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- T.** ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- U.** ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- V.** ASTM E 413-87 - Classification of Rating Sound Insulation
- W.** ASTM E 1332-10a - Classification for Rating Outdoor-Indoor Sound Attenuation
- X.** ASTM E 1592 - Structural Performance of Metal Roofing and Siding Systems by Uniform Static Air Pressure Difference

- Y. ASTM E 1996 - Test Method for Performance of Exterior Impact Protective Systems by Windborne Debris in Hurricanes, 15 pound
- Z. ASTM F 1642 - Standard Test Method for Glazing and Glazing Systems subject to Airblast Loading
- AA. CAN 4-S101 - Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- BB. CAN/ULC S102 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- CC. CAN/ULC S126 - Standard Method of Test for Fire Spread Under Roof-Deck Assembly.
- DD. CAN/ULC S134 - Fire Test of Exterior Wall Assemblies
- EE. CAN/ULC S138 - Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration
- FF. US Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.4 PERFORMANCE REQUIREMENTS

A. Structural and Wind Load Tests:

1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/180 for exterior wall panels, L/120 for partition and liner walls and L/240 for ceiling panels.
2. FM Approval Standard 4881, Standard for Class 1 Exterior Wall Systems. Wind pressures are calculated per FM Global Property Loss Prevention Data Sheet 1-28, ratings are established and support spacing is determined based on FM Approval Standard 4881 listings.
3. Large Missile Impact Test: Conducted in accordance with ASTM E 1886 Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems and ASTM E 1996 Windborne Debris in Hurricanes.

A. Thermal Performance:

1. When tested in accordance with ASTM C 518, "measurement of steady state thermal transmission", the panels shall provide a K-factor of 0.14 btu/sf/hr./deg. F at a 75 degrees F (24 degrees C) mean temperature.

B. Vapor Barrier:

1. Air Infiltration: Air infiltration shall not exceed 0.06 cfm per square foot of wall area when tested in accordance with ASTM E 283 at a static pressure of 12 psf (0.576 kPa)

2. Static Water Penetration: No uncontrolled water penetration through the panel joints at a static pressure of 20 psf (0.96 kPa) when tested in accordance with ASTM E 331.
3. Dynamic Water Penetration: No uncontrolled water penetration through panel joints when subjected to a 95 mph (153 kph) slip stream air flow and application of water for a 15 minute period in accordance with AAMA501.1.
4. Condensation Resistance Factor: Minimum condensation resistance factor of the panel shall be 92 when tested in general accordance with AAMA 1503.1.

C. Fire:

1. Surface Burning Characteristics: Insulated core shall have been tested in accordance with ASTM E 84 for surface burning characteristics. The core shall have a maximum flame spread of 25 and a smoke developed rating of 450.
2. Factory Mutual Research Corporation (FMRC) Standard 4880, 50 foot (15.24 m) High Corner Test for Unlimited Height Structures: Panel assembly shall not support a self-propagating fire which reaches any limits of the 50 foot (15.24 m) high corner test structure as evidenced by flaming or material damage of the ceiling of the assembly.
3. National Fire Protection Association - Fire Propagation: Fire assembly shall meet the requirements of NFPA 285 Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies and NFPA 286 Fire Tests for Evaluating Contribution of Wall and Ceiling Finish to Roof Fire Growth. Heat potential shall be determined using NFPA 259 Test Method for Potential Heat of Building Materials.
4. Canadian Certifications Flame spread: Evaluation of fire spread over the exterior surface conducted in compliance with CAN/ULC S138 Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration.
5. IBC Chapter 26: Panel performance under the above test methods, shall meet the requirements of IBC, Chapter on foam plastics.

D. Bond Strength:

1. Fatigue Test: Panel shall withstand deflection cycling at L/180 to two million alternate cycles with no evidence of delamination, core cracking or permanent bowing.
2. Freeze/Heat Cycling: Panel shall exhibit no delamination, surface blistering or permanent bowing when subjected to cyclic temperature extremes of minus 20 degrees F (minus 28 degrees C) to plus 180 degrees F (plus 82 degrees C) for twenty-one eight hour cycles.
3. Humidity Test: Panel shall exhibit no delamination or metal corrosion at

interface when subjected to a 140 degree F (60 degree C) temperature and 100 percent relative humidity for a total of 1200 hours.

4. Autoclave Test: Panel shall exhibit no delamination of the foam core from metal skins when exposed to 2 psi (0.122 kg/sq. cm) pressure at a temperature of 212 degrees F (100 degrees C) for a total of 2-1/2 hours.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Material type, metal thickness and finish.
 4. Installation methods.
- B. Shop Drawings: Including elevations, fastening patterns, sections of each condition and details as required.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Panel Sample: Submit 1 foot (305 mm) high by full width sample panel for each profile specified indicating the metal, texture, color and finish.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing factory foamed in place insulated metal panels with a minimum documented experience of ten years.
- B. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Shield foam insulated metal roof panels from direct sunlight until installation
- C. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.

- D. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written forty year limited warranty on paint finish for adhesion to the substrate and a thirty year limited warranty on chalk and color fade.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Metl-Span LLC, which is located at: 1720 Lakepointe Dr. Suite 101 ; Lewisville, TX 75057-6425; Toll Free Tel: 877-585-9969; Tel: 972-221-6656; or approved equal.

2.2 INSULATED METAL WALL PANELS

- A. Insulated Metal Wall Panels: Metl-Span III CF Insulated Metal Wall Panel, roll-formed exterior and interior steel sheet faces chemically bonded to continuously foamed-in-place insulated core; laminated panels are not acceptable.
 1. Stucco Embossed Flat Wall Panel.
 2. Module Width: 42 inches.
 3. Panel Length: 10 feet to 53 feet with factory cut panel ends, factory notching and factory swaged ends. Manufacture panels with the longest practicable length to suit the installation without joints.
 4. Panel Thickness: 3 inches
 5. Foam Core: Continuously foamed-in-place, zero ODP and zero VOC closed cell polyurethane, Factory Mutual Class 1 approval.
 6. Thermal Value: K-factor, Btu in/ft² hr degrees F @ 75 degrees F mean core temperature = 0.140. R-value minimum 24.15.
 7. Joint: Mechanically closed single lock standing seam at the exterior side joint. Interior side joint is a single tongue and groove interlock.
 8. Side Connections: Offset double tongue and groove joinery with an extended metal shelf allowing fasteners to penetrate both metal faces with clips concealed in the side joint.

2.3 MATERIALS

- A. Exterior Face:
 - 1. Material: G-90 galvanized steel conforming to ASTM A 653 or, at the manufacturer's discretion, AZ-50 aluminum-zinc coated steel conforming to ASTM A-792, minimum grade 33, with a stucco embossed texture.
 - 2. Thickness:
 - a. 24 gauge (0.0250 inch).
- B. Interior Faces:
 - 1. Material: G-90 galvanized steel conforming to ASTM A 653 or, at the manufacturer's discretion, AZ-50 aluminum-zinc coated steel conforming to ASTM A-792, minimum grade 33, with a stucco embossed texture.
 - 2. Thickness:
 - a. 24 gauge (0.0250 inch).
- C. Foam Core: Continuously foamed-in-place, zero ODP and zero VOC closed cell polyurethane, Factory Mutual Class 1 approval.
- D. Panel Finish:
 - 1. Exterior Finish: One coat 70 percent polyvinylidene fluoride, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer; color "Sandstone" or as selected by Architect from manufacturer's standard colors.
 - 2. Interior Finish: One coat, factory applied coil coating in standard Polar White, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer; color USDA compliant.
- E. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels. Color as selected by the engineer.
- F. Expansion fasteners: Elco Fab-Lok FAC-10, 305 Stainless Steel (or equal). Size and spacing as required by the manufacturer.
- G. Sealant: Sealant as recommended by panel manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Verify intermediate framing member and secondary structural supports are aligned to the following tolerances:

1. 0 to 1/4 inch outward of the actual wall framing plane for members at 10 foot or greater spacing.
 2. 0 to 1/8 inch outward of the actual wall framing plane for members at 5 foot to 10 foot spacing.
 3. 0 to 1/16 inch outward of the actual wall framing plane for members at less than 5 foot spacing.
- C. Verify wall openings, windows, doors, or louvers through walls are properly located.
- D. Correct defective conditions before beginning work.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- C. Install flashing and trim true and in proper alignment.
- D. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tightness and integrity of the vapor barrier.

3.3 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 43 13

FORMED VENTED SOFFIT PANELS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal Soffit panels.
- B. Flashing and trim integral to wall panels.
- C. Fasteners and accessories for installation of panel system.

1.2 RELATED REQUIREMENTS

- A. Section 01 33 00 – Submittal Procedures.
- B. Section 01 45 00 – Quality Control.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Product Literature for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.

1.4 REFERENCE STANDARDS

- A. UL 580 - Uplift Resistance of Roof Assemblies
- B. UL 1897 - Uplift Test for Roof Covering Systems
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A 792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process.
- E. ASTM A 924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.5 PERFORMANCE REQUIREMENTS

- A. Structural and Wind Load Tests:
 - 1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/240.

2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.
3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7 foot purlin spacing and 166 psf when tested on 5 foot purlin spacing.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty year limited warranty on paint finish for adhesion to the substrate and a thirty year limited warranty on chalk and color fade.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span, A Division of ASC Profiles Inc. - A BlueScope Steel Company, 2110 Enterprise Boulevard, West Sacramento, CA 95691, 800-726-2727, 916-372-0933 (Corporate Office) 907-227-1607 (Alaska Office) or approved equal.

2.2 MATERIALS

- A. Metal Wall Panels: AEP Vented Flush-Panel
 1. Prefinished Galvalume® or Zinalume® sheet, ASTM AZ50 made

- of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792.
2. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 3. 1' Standoff from Substrate.
 4. Thickness: 24 gauge (0.0250 inch).
 5. Two pencil ribs.
 6. Provide 7.8% Net Free Area
 7. Concealed Fasteners.
 8. 12" Net Coverage.
- B. Panel Finish:
1. Exterior Finish: One coat 70 percent polyvinylidene fluoride, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer; color Cool Forest Green.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Fasteners and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
1. Overall rake to rake tolerances plus or minus 2 inches or plus or minus 1 inch at each rake.
 2. Vertical deviation from the nominal wall plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length and plus or minus 1/2 inch over the entire wall area.
- C. Verify wall openings, curbs, pipes, sleeves, ducts, or vents through wall are solidly set, reglets are in place, and nailing strips located.
- D. Correct defective conditions before beginning work.
- E. If substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- D. Install flashing and trim true and in proper alignment.
- E. Protective film on trim shall be removed before exposure to sunlight.
- F. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight

3.3 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A.** Painting of interior and exterior building surfaces.
- B.** Surface preparation, priming, and coats of paint are in addition to shop priming.

1.2 RELATED REQUIREMENTS

- A.** Section 06 1000 - Rough Carpentry
- B.** Section 07 4213 - Metal Wall Panels

1.3 DELIVERY, HANDLING, AND STORAGE

- A.** All materials shall be new and be delivered to the project site in unopened containers. Paints shall be stored in a suitable protected area that is heated or cooled as required to maintain temperatures within the range recommended by the paint manufacturer.
- B.** Paint containers shall bear labels that plainly show the following:
 - 1.** Name or title of material.
 - 2.** Federal Specification number, if applicable.
 - 3.** Manufacturer's name.
 - 4.** Manufacturer's stock number and date of manufacture.
 - 5.** Color name and number.
 - 6.** Contents by volume, for major pigment and vehicle constituents.
 - 7.** Thinning instructions.
 - 8.** Application instructions.

1.4 SUBMITTALS

- A.** Submit product data and samples.
- B.** The following specific information shall be provided:
 - 1.** Data: For each paint system used, Supplier shall obtain from

each manufacturer, a Paint System Data Sheet, Technical Data Sheets, and

paint colors available (where applicable) for each product used in the paint system, except for products applied by equipment manufacturers. Required information shall be submitted on a system-by-system basis. Supplier shall also provide copies of the paint system submittals to the coating applicator.

2. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

D. Colors:

1. As delineated on Sheet A1 – Painting Notes

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Standard Paint:** Manufacturers offering products complying with the requirements of these specifications and Painting Notes on A1:

1. Paints:
 - a. Devoe Coatings
 - b. Sherwin Williams

2.2 MATERIALS

- A. General:** All products submitted shall conform to federal, state, and local requirements limiting the emission of volatile organic compounds. Specific information may be secured through the local office of the Air Pollution Control Officer.

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

- C. Paint Coordination:** Provide finish coats that are compatible with prime paints used. Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Engineer in writing of any anticipated problems arising from using specified coating systems with substrates primed by others.

D. Material Quality:

1. Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard,

best grade product will not be acceptable. Proprietary names used to designate colors or materials are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers, but are used to establish the intended finish type and quality. Equivalent products of other manufacturers may be used upon proper submittal and acceptance; however, proof of replacement materials being readily available at future dates from established, nationally-recognized sources is required.

2. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.3 COLORS

- A. Colors shall be formulated with colorants free of lead and lead compounds.

2.4 MODULE BUILDING PAINT SYSTEMS

- A. Refer to Painting Notes Sheet A1 for Exterior and Interior painting of the module.

PART 3 – EXECUTION

3.1 GENERAL

- A. All materials of a paint system, including primer and finish coats, shall be produced by the same paint manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer of the particular coating.
- B. Paint all exposed surfaces,.

3.2 EXAMINATION

- A. It is the intent of these Specifications that Contractors and their subcontractors employed on the jobsite will leave the surfaces of their work in such a condition that only minor cleaning, sanding, and filling is required prior to surface preparation and painting. It is the responsibility of the Contractor to inspect and provide substrate surfaces that are prepared in accordance with these Specifications and the printed directions and recommendations of the paint manufacturer whose product is to be applied.

3.3 PROTECTION OF MATERIALS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Openings in motors shall be masked to prevent paint and other materials

from entering the motors.

3.4 INSTALLATION

- A.** Paint shall not be applied in temperatures exceeding the manufacturer's recommended maximum and minimum allowable, nor in dust, smoke-laden atmosphere, damp or humid weather.
- B.** Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 90 degrees F, unless otherwise permitted by the paint manufacturer's printed instructions.
- C.** Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F and 95 degrees F, unless otherwise permitted by the paint manufacturer's printed instructions.
- D.** Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- E.** Painting may be continued during inclement weather, only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.
- F.** Do not apply paint materials when temperature and humidity conditions can reasonably be predicted to change from manufacturer's application limitations prior to the elapse of adequate drying time.

3.5 SAFETY

- A.** Painting shall be performed in strict accordance with the safety recommendations of the paint manufacturer; with the safety recommendations of the National Association of Corrosion Engineers contained in the publication, Manual for Painter Safety; federal, state, and local agencies having jurisdiction.

3.6 PAINT MIXING

- A.** Multiple-component coatings shall be prepared using all of the contents of the container for each component as packaged by the paint manufacturer. No partial batches will be permitted. Multiple-component coatings that have been mixed shall not be used beyond their pot life. Contractor shall provide small quantity kits for touch-up painting and for painting other small areas. Only the components specified and furnished by the paint manufacturer shall be mixed. No intermixing of additional components for reasons of color or otherwise, even within the same generic type of coating, will be permitted.
- B.** Paint materials shall be kept sealed when not in use.

3.7 LOCATION WHERE PAINTING IS PERFORMED

- A.** Surface preparation and painting shall be done at the project site, or in the fabrication facility.

3.8 PREPARATION OF

SURFACES A. General:

1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified for particular substrate condition.
2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted; or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

B. Preparation of Structural Steel Surfaces and Doors:

1. Minimum surface preparation shall be Commercial Blast Cleaned per SSPC-SP6. Remove all oil and grease in accordance with the Solvent Cleaning requirements outlined in this section.
2. Coating Time: Coat any bare steel within 8 hours or before flash rusting occurs.
3. Sharp edges, surface defects, or protrusions shall be ground flat and smooth. Any welded areas shall be sanded before painting.

C. Preparation of Existing Coated Surfaces:

1. Existing coated or primed surfaces to be repainted or final coated shall be detergent washed and freshwater rinsed. Loose, abraded, or damaged coatings shall be cleaned to substrate by Hand or Power Tool, SSPC- SP2 or SSPC-SP3. Surrounding intact coating shall be feathered. One spot coat of the specified primer shall be applied to bar areas overlapping the prepared existing coating. One full finish coat of the specified primer or finish coat(s) shall be applied overall. If an aged, plural-component material is to be top coated, contact the coating manufacturer concerned for additional surface preparation

requirements.

2. In the case of an application of a cosmetic coat the exact nature of the existing coatings is not known in all cases; and, while it is assumed that they have oxidized sufficiently to prevent lifting or peeling when over coated with the paints specified, the compatibility shall be checked by application to a small area prior to starting the painting. If lifting or other problems occur, request disposition from the Engineer.
- D. Solvent Cleaning: Solvent cleaning shall consist of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by the use of solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods which involve a solvent or cleaning action. This method conforms with SSPC-SP1.

3.9 APPLICATION OF

PAINT A. General:

1. Manufacturer's written instructions for applying each type of paint or protective coating shall be furnished to the Engineer prior to application. Cleaned surfaces and all coats shall be inspected prior to the succeeding coat. Schedule such inspection with the Engineer in advance. Apply all coatings in strict accordance with the paint manufacturer's recommendations, as reviewed by the Engineer. Sufficient time shall be allowed between coats to assure thorough drying of previously applied paint.
2. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint until the paint film is of uniform finish, color, and appearance. Give special attention to ensure that all surfaces including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

B. Application:

1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
2. Paint the back sides of access panels and removable or hinged covers, locker doors, etc., to match the exposed surfaces.
3. Finish exterior doors and frames, on tops, bottoms, and side edges, the same as the exterior faces, unless otherwise indicated.
4. Sand lightly between each succeeding enamel or varnish coat.
5. Omit the first coat (primer) on metal surfaces that have been shop primed and touch-up painted, unless otherwise indicated.

6. Use foam brushes or rollers on metal doors and frames and similar surfaces to achieve finishes that are completely void of brush stroke tracks and marks.
 7. Back-brush inside surfaces of siding, trim, and miscellaneous wood prior to installation and painting when necessary to avoid material cupping or warping.
 8. Units to be bolted together and to structures shall be painted prior to assembly or installation.
- C. Film Thickness:**
1. Coverage is listed as either total minimum dry film thickness in mils (MDFT) or the spreading rate in square feet per gallon (SFPG). Per coat determinations are listed as MDFTPC or SFPGPC. The number of coats is the minimum required irrespective of the coating thickness. Additional coats may be required to obtain the minimum required paint thickness, depending on method of application, differences in manufacturers; products, and atmospheric conditions. Maximum film build per coat shall not exceed the coating manufacturer's recommendations.
 2. Metal and wood surfaces shall be visually inspected to ensure proper and complete coverage has been attained.
 3. Particular attention shall be given edges, angles, flanges, etc. Where insufficient film thicknesses are likely to be present, ensure proper millage in these areas.
- D. Damaged Coatings:**
1. Damaged coatings, pinholes, and holidays shall have the edges feathered and repaired in accordance with the recommendations of the paint manufacturer, as reviewed by the Engineer.
 2. Repair of fusion bonded coatings to be as recommended by the original applicator. Liquid repair kits to be provided for this purpose by the applicator, as recommended by the coating manufacturer.
 3. All finish coats, including touch-up and damage-repair coats shall be applied in a manner which will present a uniform texture and color-matched appearance.
- E. Unsatisfactory Application:**
1. If the item has an improper finish color, or insufficient film thickness, the surface shall be cleaned and top coated with the specified paint material to obtain the specified color and coverage. Specific surface preparation information to be secured from the coating manufacturer and the Engineer.

2. All visible areas of chipped, peeled, or abraded paint shall be hand- or power-sanded feathering the edges. The areas shall then be primed and finish coated in accordance with the Specifications. Depending on the extent of repair and its appearance, a finish sanding and topcoat may be required by the Engineer.
3. Work shall be free of runs, bridges, shiners, laps, or other imperfections. Evidence of these conditions shall be cause for rejection.
4. Any defects in the coating system shall be repaired by the Contractor per written recommendations of the coating manufacturer.
5. Leave all staging up until the Engineer has inspected the surface or coating. Staging removed prior to approval by Engineer shall be replaced.

3.10 SHIPPING

- A. In all cases where pre-coated items are to be shipped to the jobsite, all efforts will be made to protect the coating from damage. Coated items shall be battened to prevent abrasion. Contractor shall use non-metallic or padded slings and straps in handling. Items will be rejected for excessive damage, in the opinion of the Engineer.

3.11 SCHEDULING PAINTING

- A. Apply the first coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- B. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

3.12 MINIMUM COAT THICKNESS

- A. Apply each material at not less than the manufacturer's recommended spreading rate to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

3.13 PRIME COATS

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

3.14 CLEANUP

- A.** All cloths and waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a legal manner. Paint spots, oil, or stains upon adjacent surfaces and floors shall be completely removed, from the site or destroyed in a legal manner. Paint spots, oil, or stains upon adjacent surfaces and floors shall be completely removed, and the entire job left clean and acceptable to the Engineer.
- B.** Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

3.15 PROTECTION

- A.** Protect work of other trades, whether to be painted or not, against any damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting as acceptable to the Engineer.
- B.** At the completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 13 43 23

PORTABLE AND MOBILE BUILDINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fabrication of ISO (International Organization of Standardization) Conex shipping container, as shown in the contract Drawings.
- B. Supply and Acceptance of a “one trip” or “like new” ISO Container.
- C. Modification of a Standard High Cube Conex as shown in the contract drawings.

1.2 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification. Apply to this section.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Manufacturer’s product data or specification and installation instructions.

1.4 REFERENCE STANDARDS

- A. ISO Conex container shall conform to and satisfy the following regulations and standards:
 - 1. ISO 830 – Freight containers – Terminology.
 - 2. ISO 668 – Series 1 freight containers – Classification external dimensions and ratings.
 - 3. ISO 1161 – Series 1 freight containers – Corner fittings Specification.
 - 4. ISO 1496-1 – Series 1 freight containers – Specification and testing. Part 1: General cargo containers for general purposes.
 - 5. ISO 1894 – General purpose series 1 freight containers – Minimum internal dimensions.
 - 6. ISO Conex container shall comply with the customs convention of containers, 1972 and all subsequent revisions to date.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. ISO Conex container shall be constructed to be handled under the following

conditions without distortion of effect on its structural integrity:

1. Lifting full by its top corner fittings by means of spreaders.
2. Lifting full by its bottom corner fittings by means of a sling angle of 30 degrees.
3. Lifting full at forklift pockets.

PART 2 PRODUCTS

2.1 DIMENSIONS

ISO Conex Container Dimensions		
Title		20'High Cube
External	Length	20'
	Width	8'
	Height	9'-6"
Internal	Length	19'-4"
	Width	7'-8"
	Height	8'-10"
Door opening	Width	7'-8"
	Height	8'-5 1/2"

2.2 CONEX LOAD RATING

- A. Maximum gross Conex weight: 67,200 LBS.
- B. Maximum Conex payload: 58,600 LBS.

2.3 CONEX MATERIALS

PART	MATERIALS
Roof Panels	Anti-Corrosive Steel: CORTEN A, SPA-H, B480 or equivalent Y.P. : 35 kg/sq. mm T.S. : 49 kg/sq. mm
Door Panels	
Side Panels	
Front Panels	
Bottom Side	
Rails Cross	
Members	
Upper and Lower Plates of Forklift Pockets	
Rear Corner Posts	
(Outer) Door Sill	
Door Header	
Door Horizontal	
Frames Door	
Vertical Frames	
Top Side Rails	
Front Corner Posts Front	
Rear Corner Posts Inner	Rolled high tensile steel: SM490A or equivalent Y.P. : 33 kg/sq.
Floor Center Rail	Structural Steel: SS400 Y.P. : 25 kg/sq.mm
Door Locking Bars	Structural steel round pipe: STK41 Y.P. : 24 kg/sq.
Corner Fitting	Casted weldable steel: SCW480 Y.P. : 28 kg/sq.
Door Hinge Pins	300 series Stainless Steel
Door Gaskets	EPDM
Floor Boards	Hardwood Plywood, 19 ply.

2.4 SUPPLY CONNEX

- A. Conex shall be a “one-trip” or “like-new” ISO container.
1. There shall be no rips, holes, gashes, or other damages to the Conex.
 2. Conex doors shall operate freely without binding or excessive resistance.
 3. Conex exterior shall have no rust.
 4. Only double door units are acceptable.
 5. Conex shall be lockable.
- B. The container shall be constructed with steel frames, corrugated panels welded

by CO₂ shielded Arc welding. All welds of the exterior including the base frames shall be continuous with full penetration. Wooden floor shall be fixed to the cross members by self-tapping screws. All crevices shall be sealed with elastic sealing compound

PART 3 – EXECUTION

3.1 EXAMINATION

- A. The Conex shall be inspected by AUTHORITY, or AUTHORITY'S representatives, and accepted before beginning module fabrication.

3.2 FABRICATION

- A. Modify the Conex in accordance with the Contract Drawings.

END OF SECTION

SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Painting and marking.
 - 2. Valve tags, signs, and placards.
 - 3. General mechanical work.

1.2 SCOPE

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

1.3 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 1 of the specifications is to be specifically included as well as all related drawings.

1.4 RELATED WORK

- A. Related Work Specified Elsewhere:
 - 1. Electrical Specifications: Division 26
- B. Unless otherwise indicated on the electrical drawings and schedules, provide all mechanical equipment motors, motor starters, thermal overload switches, control relays, time clocks, thermostats, motor operated valves, float controls, damper motors, electrical components, wiring and any other miscellaneous Division 23 controls. Disconnect switches are included in the electrical work, unless specifically called out on mechanical Drawings or furnished as part of the mechanical equipment.
- C. Carefully coordinate all work with the electrical work shown and specified elsewhere.

1.5 PROJECT RECORD DRAWINGS

- A. In addition to other requirements of Division 1, 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.
- B. Provide one set of drawings clearly marked up with all as-built information to THE AUTHORITY within two weeks of completion.

- C. At completion of project, deliver these drawings to the Authority and obtain a written receipt.

1.6 SUBMITTALS

- A. Provide submittals for all products and systems described in Division 23 specifications and shown on the Drawings to demonstrate compliance with the requirements of the project. Provide submittals in the manner described herein and in Division 1.
- B. Painting and Marking: Submit manufacturers catalog literature for each product required.
- C. Valve Tags: Submit manufacturers catalog literature for tags as indicated on the Schedule on Sheet M1.1.
- D. Signs and Placards: Submit manufacturers catalog literature as indicated on the Schedule on Sheet M1.3.
- E. Equipment: Submit manufacturers catalog literature for each item indicated on the Mechanical Schedules on Sheet M1.1 under the Division 23 Sections that follow. See specific requirements under each section.

1.7 RECEIVING AND HANDLING

- A. See general conditions and the general requirements in Division 1 regarding material handling.
- B. Deliver packaged materials to the jobsite in unbroken packaging with manufacturer's label, and store to facilitate inspection and installation sequence.
- C. Protect all materials and equipment during the duration of construction work against contamination and damage. Replace or repair to original manufactured condition any items damaged during construction. Immediately report any items found damaged to the Authority prior to commencing construction.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Division 1 - Material and Equipment: Storage and protection.

1.9 QUALITY ASSURANCE

- A. Division 1 - Quality Control
- B. Perform all work in accordance with the latest adopted editions of the International Fire Code, the International Building Code, and the International Mechanical Code including State of Alaska amendments. Comply with all applicable State and Federal regulations.
- C. Perform work with skilled craftsman specializing in said work. Install all materials in a neat and orderly, and secure fashion as required by specifications and commonly recognized standards of good workmanship.

1.10 SCHEDULE OF WORK

- A. The work 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 meet scheduled completion dates, and to avoid delaying any other trade.

- B. The Authority 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.

1.11 SUBSTANTIAL COMPLETION

- A. Contact the Authority one week prior to completion of all work to schedule substantial completion inspection. The Authority will generate a punchlist of corrective action items during the inspection. Work will not be considered complete until all corrective action items in the Authority's punch list have been satisfactorily completed and photographic or other positive documentation has been provided to the Authority.

1.12 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, 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 Authority, clear any designated area or areas 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.

1.13 SPECIAL CONDITIONS

- A. Ensure that the appropriate safety measures are implemented and the all workers are aware of the potential hazards from electrical shock, burn, rotating fans, pulleys, belts, hot manifolds, noise, etc. associated with working near power generation and control equipment.

1.14 WARRANTY

- A. Division 1 - Closeout Requirements: Warranties.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide all equipment and materials required for a complete system.
- B. All equipment and materials supplied under this Contract are new unless specifically indicated as existing. Where additional or replacement items are required, provide like items by the same manufacturer to the maximum extent practical.
- C. Install all material and equipment in accordance with manufacturer's installation instructions and recommendations unless specifically indicated otherwise.

2.2 PAINTING

- A. Carbon Steel Pipe - Paint all exposed carbon steel pipe that is not insulated except for engine exhaust. Wire brush and wipe down with solvent. Prime with one coat of alkyd primer, Devco Rustguard 4160 or approved equal, to 2 mils DFT. Finish with alkyd enamel, Devco Devguard 4308 or approved equal. On interior piping finish with one

coat to 2 mils DFT. On exterior piping finish with two coats to 4 mils DFT. Color as follows:

1. Diesel Fuel – Red
 2. Coolant – Green
- B. Paint all steel fabrications and tanks. Sandblast or wire brush to bare metal and wipe down with solvent. Prime and finish with two coats of self-priming epoxy, Sherwin Williams Macropoxy 646 or approved equal, color Structural Gray 4031.
- C. Touch-up – finish all cut ends and damaged surfaces of galvanized and zinc plated supports and fasteners with spray on Cold Galvanizing Compound, ZRC or approved equal. Touch up paint on fabricated items to match original.

2.3 MARKING

- A. Install flow arrows on diesel fuel and coolant piping using same color scheme as pipe painting. Black arrows over colored backgrounds, self-adhesive vinyl, Seton arrows on roll or approved equal. On insulated piping install flow arrows over jackets.

2.4 VALVE TAGS

- A. Specific Function Valve Tags – For all valves marked with a specific function, provide color coded tags worded as indicated on the schedules. Install as noted.
- B. Standard Valve Tags – For all valves not marked with a specific function, provide NO/NC tags as indicated on the schedules. Install as noted.

2.5 SIGNS AND PLACARDS

- A. Provide decals and sign boards, color coded and worded as indicated on the schedules. Install as noted.

PART 3 - EXECUTION

3.1 DRAWINGS

- A. The mechanical drawings are generally diagrammatic and do not necessarily show all features of the required work. Provide all equipment and materials required for a complete system. Complete details of the building which affect the mechanical installation may not be shown. For additional details, see Civil, Architectural, Structural, and Electrical Drawings. Coordinate work under this section with that of all related trades.
- B. Contractor to field verify all dimensions and conditions prior to start of construction. Immediately contact the Authority for clarification of questionable items or apparent conflicts.

3.2 CUTTING, FITTING, REPAIRING, PATCHING, AND FINISHING

- A. Where previously completed building surfaces or other features must be cut, penetrated, or otherwise altered, such work shall be carefully laid out and patched to the original condition. Perform work only with craftsmen skilled in their respective trades.
- B. Do not cut, drill, or notch structural members unless specifically approved by the Authority. Minimize penetrations and disruption of building features.

- C. Seal all exterior ceiling and wall penetrations as indicated.

3.3 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.4 INSTALLATION OF EQUIPMENT

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

3.5 SCOPE OF ISOLATION AND RESTRAINT WORK

- A. All vibrating equipment and the interconnecting pipe and ductwork shall be isolated to eliminate the transmission of objectionable noise and vibration from the structure.
- B. Mechanical equipment shall be carefully checked upon delivery for proper mechanical performance, which shall include proper noise and vibration operation.
- C. All installed rotating equipment with excessive noise and/or vibration, which cannot be corrected in place, shall be replaced at no cost to the Authority.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Flashing.
4. Sleeves.
5. Formed steel channel.

B. Related Sections:

1. Section 23 05 00 – Common Work Requirements for Mechanical.
2. Section 23 21 13 - Hydronic Piping: Execution requirements for placement of hangers and supports specified by this section.
3. Section 23 11 13 - Fuel and Lube Oil Piping: Execution requirements for placement of hangers and supports specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B31.1 - Power Piping.
2. ASME B31.9 - Building Services Piping.

B. ASTM International:

1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
2. ASTM E814 - Standard Test Method for Fire Tests of Through Penetration Fire Stops.
3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data: Hangers and Supports: Submit manufacturers catalog data including load capacity. Indicate finish for interior and exterior applications.
- C. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

1.4 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Conform to applicable code for support of coolant and hydronic piping.
- C. Perform Work in accordance with State of Alaska Standards.

1.5 QUALIFICATIONS

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Anvil, B-line, Grinnell, or approved equal.
 - 2. Division 1 - Product Options and Substitutions.

2.2 FLASHING AND SEALING

- A. Caps & Coverings: Steel, 16 gauge minimum.
- B. For penetration of all interior wall penetrations seal with polyurethane caulking.
- C. For piping smaller than 2" through exterior walls seal with polyurethane caulking.
- D. For piping 2" and larger through exterior walls install flashing as indicated on Drawings. Oatey master flash or approved equal.

2.3 STRUCTURAL STEEL

- A. Miscellaneous shapes and plate: ASTM A-36.
- B. Rectangular tubing: ASTM A-500 Grade B.
- C. Structural Pipe: ASTM A-53 or ASTM A-106B.
- D. Paint as indicated.

2.4 FORMED STEEL CHANNEL

- A. Strut: Cold formed mild steel channel strut, pre-galvanized finish and slotted back unless specifically indicated otherwise.
- B. Standard Strut: 12 gauge thick steel, 1-5/8" x 1-5/8", B-line B22-SH-Galv or approved equal.
- C. Double Strut: 12 gauge thick steel, 1-5/8" x 3-1/4", B-line B22A-SH-Galv or approved equal.
- D. Shallow Strut: 14 gauge thick steel, 1-5/8" x 13/16", B-line B54-SH-Galv or approved equal.
- E. Where strut is welded to tanks or structures provided plain (unfinished black) solid back strut: 12 gauge thick steel, 1-5/8" x 1-5/8", B-line B22-PLN or approved equal.
- F. On all exterior installations provide hot dip galvanized strut and fittings.

2.5 FITTINGS AND ACCESSORIES

- A. Hanger Rods: Continuous threaded rod, carbon steel except for exterior installations provide hot dip galvanized.
- B. Provide fittings, brackets, channel nuts, and accessories designed specifically for use with specified channel strut. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- C. Pipe Clamps: Two piece pipe clamp designed to support pipe tight to strut, B-line B20##, or approved equal, as indicated on the Pipe/Tubing Strut Clamp Schedule on Sheet M1.1. Zinc plated carbon steel except for exterior installations carbon steel except for exterior installations provide hot dip galvanized.
- D. Pipe Straps: Carbon Steel two-hole pipe strap. B-line B2400 or approved equal.

2.6 FASTENERS

- A. All bolts, nuts, and washers to be zinc plated carbon steel except on exterior installations provide hot dip galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.2 PREPARATION

- A. Obtain permission from the Authority before drilling or cutting structural members.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Support piping and equipment as shown on Drawings using specified supports and fasteners. If not detailed on Drawings, support from structural members with pipe hangers, clamps or pipe straps specifically intended for the application.
- B. Independently support pumps and equipment. Supporting piping from connections to equipment shall not be permitted.
- C. Support horizontal piping as scheduled.
- D. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- E. Place hangers within 12 inches of each horizontal elbow.
- F. Use hangers with 1-1/2 inch minimum vertical adjustment.
- G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 23 07 19.
- K. For specific piping and equipment support details reference Drawings.

3.4 INSTALLATION - FLASHING

- A. Seal and flash all wall penetrations as indicated.

3.5 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

3.6 SCHEDULES

- A. Copper Tube and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	Copper Tube Maximum Hanger Spacing (Ft)	Steel Pipe Maximum Hanger Spacing (Ft)	Copper Tube Hanger Rod Diameter (In)	Steel Pipe Hanger Rod Diameter (In)
1/2 & 3/4	5	7	3/8	3/8
1 & 1-1/4"	6	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
3	10	10	1/2	1/2
4	12	10	1/2	5/8

END OF SECTION

SECTION 23 07 19 PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Piping insulation, jackets and accessories.
 - 2. Exhaust piping insulation, jackets and accessories.
 - 3. Charge air tubing insulation, jackets, and accessories.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 35 16.10 - Engine Exhaust and Crank Vent Piping.

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
 - 3. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 - 4. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
 - 5. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Pipe insulation maximum flame spread index of 25 and maximum smoke developed index of 50 in accordance with ASTM E84.
- C. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

- D. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Applicator: Company specializing in performing work specified in this section.

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 EXHAUST PIPE INSULATION

- A. Exhaust Pipe Insulation: TYPE P-2: ASTM C547, 1-1/2" preformed rigid mineral wool fiber insulation made with basalt rock and slag. Thermal Conductivity: 0.25 at 100 degrees F. Maximum Operating Temperature: 1200 degrees F. ROXUL Techton 1200 or approved equal.
- B. Cover with aluminum jackets.
- C. Wall Penetrations: Where indicated on drawings install TYPE 1 mineral wool fiber batt insulation. Roxul Safe and Sound or approved equal. Fill entire void with insulation.

2.2 PIPE INSULATION JACKETS

- A. Aluminum Pipe Jacket: ASTM B209. Exterior grade, 0.016 inch thick sheet, embossed finish.
- B. Fittings: Pre-formed aluminum covers. PABCO or approved Equal.
- C. Join with longitudinal slip joints and minimum 2 inch laps.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.
- B. Verify piping has been tested before applying insulation materials.
- C. Verify surfaces are clean and dry, with foreign material removed.
- D. Verify piping has been painted up to areas to be insulated.

3.2 INSTALLATION - PIPING SYSTEMS

- A. Install insulation in accordance with manufacturer's installation instructions.
- B. Install insulation where indicated on drawings.

END OF SECTION

SECTION 23 09 00
INSTRUMENTATION AND CONTROL DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Instrumentation Equipment
 2. Pressure gauge.
 3. Thermometers.
 4. Thermometer thermowell.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
B. Section 23 21 16 - Hydronic Specialties and Equipment.
C. Section 23 31 13 – Metal Ducts and Ventilation Equipment.
D. Division 26 - Electrical

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 3. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
 4. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
- B. ASTM International:
1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 2. ASTM A536 - Standard Specification for Ductile Iron Castings.
 3. ASTM B32 - Standard Specification for Solder Metal.
 4. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 5. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
 6. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing.
 7. ASTM E1 - Standard Specification for ASTM Thermometers.
 8. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.
- C. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
- D. National Electrical Manufacturers Association:
1. NEMA DC 3 - Residential Controls - Electrical Wall Mounted Room Thermostats.
 2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. National Fire Protection Association:
1. NFPA 72 - National Fire Alarm Code.
 2. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
1. Submit manufacturers catalog literature including manufacturer's installation instructions for each item indicated on the Instrumentation Equipment Schedule on Sheet M1.1.
 2. Submit manufacturer's catalog information hoses and all other items specified herein.

1.5 CLOSEOUT

- A. Division 1 - Closeout Requirements
- B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.
- C. Operation and Maintenance Data: Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing Work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept controls on site in original factory packaging Inspect for damage.

1.8 COORDINATION

- A. Coordinate installation of control components in work of Divisions 26 and 33.

PART 2 PRODUCTS

2.1 INSTRUMENTATION EQUIPMENT

- A. Provide all equipment and devices as indicated in the Instrumentation Equipment Schedule on Sheet M1.1.

2.2 PRESSURE GAUGES

- A. 2-1/2" dial size, dry type, stainless steel case, tube, and socket, 1/4" NPT bottom connection. Range as indicated on Drawings.
- B. Range 0-15 psi: Trerice Model 700SS-25-02-L-A-080 or approved equal.

2.3 THERMOMETERS

- A. 3" diameter dial, bimetal type, stainless steel case and stem, 1% of full accuracy, adjustable angle and swivel head, 2-1/2" stem length, 20-240°F range dual scale.
- B. Trerice B836-02-05 or approved equal.
- C. Provide all thermometers with a 3/4" NPT brass thermowell.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Check equipment for damage that may have occurred during shipment. Repair damaged equipment as required or replace with new equipment.
- B. Verify location of thermostats and other exposed control sensors with Drawings before installation.
- C. Verify building systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Install controls and instrumentation in accordance with manufacturer's installation instructions.
- B. Install conduit and electrical wiring in accordance with Division 26.

3.3 INSTALLATION - THERMOMETERS AND GAGES

- A. Install instrumentation where indicated on the Drawings.
- B. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- C. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate.
- D. Do not install hydronic pressure gauges until after systems are pressure tested.

3.4 FIELD QUALITY CONTROL

- A. After completion of installation, test and adjust control equipment.

3.5 DEMONSTRATION AND TRAINING

- A. Demonstrate complete operation of systems, including sequence of operation prior to Date of Substantial Completion to the Authority.

END OF SECTION

SECTION 23 11 13 FUEL AND LUBE OIL PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all interior and exterior fuel piping work.
- B. Section Includes:
 - 1. Fuel oil piping.
 - 2. Unions and flanges.
 - 3. Valves.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 12 13 - Fuel and Lube Oil Equipment and Specialties.
- D. Section 26 32 13 – Engine Generators.

1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working-Pressure Rating: Unless otherwise indicated, minimum pressure requirement for fuel and lube oil piping is 150 psig.

1.4 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.1 - Power Piping.
 - 2. ASME B31.9 - Building Services Piping.
 - 3. ASME B16.5 Flanges and Flanged Fittings
 - 4. ASME B16.9 Factory-Made Wrought Steel Butt welding Fittings
 - 5. ASME B16.11 Forged Fittings, Socket-Welding and Threaded
 - 6. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International:
 - 1. ASTM A106B – Standard Specification for Seamless Carbon Steel Pipe for High Temperature Services
 - 2. ASME B16.11 Forged Fittings, Socket-Welding and Threaded
- C. Underwriters Laboratories Inc.:
 - 1. UL 142 – Steel Aboveground Tanks for Flammable and Combustible Liquids.

1.5 SYSTEM DESCRIPTION

- A. Provide piping of material as specified in PART 2.

- B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded connections to valves, equipment.
- C. Provide pipe hangers and supports per Drawings and specifications.

1.6 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit manufacturers catalog information for pipe materials, fittings, and accessories.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
 - 3. Hoses: Submit manufacturers catalog information for hose and fittings.
- C. Welders' Certificate: Include welders' certification of compliance in accordance with Quality Assurance below.

1.7 CLOSEOUT

- A. Division 1 - Closeout Requirements.

1.8 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- C. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.
- D. Perform pipe welding with experienced welder with current API or equivalent certification for all pipe welding in all positions.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing Work of this section with current certification.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall be new unless otherwise specified. All items of the same type shall be of the same manufacturer.

2.2 PIPE

- A. Oil Pipe (DFS, DFR): ASTM A106B seamless black steel pipe, Schedule 80.
- B. Vent Pipe: ASTM A53B ERW welded galvanized steel pipe, Schedule 40.

2.3 PIPE FITTINGS

- A. Oil Pipe and Fittings shall be full penetration butt welded. Provide ASTM A235 seamless domestic carbon steel butt weld joints and fittings for all pipe 1-1/2 inches in diameter and larger where indicated on plan and specification's. Provide socket weld or threaded joints for all piping smaller than 1-1/2 inches in diameter using ASTM 105 domestic, forged steel fittings, minimum 3000 lb.
- B. Flanges shall be ASTM A105 domestic forged steel, ANSI class 150 lbs.
- C. Provide flanged connections where indicated on Drawings to allow removal of individual components.
- D. Provide spiral wound metallic gaskets and coat with anti-seize compound prior to assembling flanged joints.
- E. Perform pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.
- F. Vent Pipe and Fittings shall have threaded joints with minimum 300# galvanized threaded fittings.

2.4 BALL VALVES

- A. Flanged Ball Valves: Reduced port, carbon steel uni-body, ANSI 150# raised face flanged ends, stainless steel ball and trim, TFM seat and PTFE seals for NACE MR0175 service, lockable handle, 150 psig minimum working pressure. PBV C-5410-31-2236-FTNL or approved equal. Note that for a substitute valve to be approved it must be a domestic manufactured high quality industrial valve such as Apollo.
- B. Threaded Ball Valves: Carbon steel body, threaded ends, stainless steel ball and trim, PTFE seat and Graphite/PTFE seals for NACE MR0175 service, lockable handle, 150 psig minimum working pressure. PBV C-5312-38-2236-TL-NC, PBV C-5322-38-2236-TL-NC or approved equal. Note that for a substitute valve to be approved it must be a domestic manufactured high quality industrial valve such as Apollo.

2.5 CHECK VALVES

- A. Threaded Check Valves: Brass body, threaded ends, spring close ball cone check style with soft seat, 150 psig minimum working pressure. Dixon Valve No. 61 or approved equal.

2.6 PRESSURE RELIEF VALVES

- A. Threaded Pressure Relief Valves: Bronze body, hard seat, MPT inlet by FPT outlet, size and pressure setting as indicated on the design drawings, Kingston 103SS or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.2 PREPARATION

- A. Ream threaded pipe ends. Remove burrs. Thoroughly coat male pipe ends with Hercules Gripp pipe joint compound prior to assembling.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Drawings and specifications. Reference Section 23 05 29.

3.4 INSTALLATION - PIPING

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 23 05 00.
- F. Install identification on piping systems. Refer to Section 23 05 00.
- G. Install valves with stems upright or horizontal, not inverted.
- H. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.5 TESTING

- A. Division 1 – Quality Control
- B. Test all fuel and lube oil piping with minimum 125 psig air. Test 100% of welds visually for leaks with each joint soaked in a foaming soapy water solution, and visually inspect each joint for leaks. Isolate and pressure test each run of piping for a minimum of one hour. Provide blind flanges, threaded caps or plugs at each end of the test section as needed. Do not conceal pipe joints before pressure testing is complete. Isolate equipment and components rated for lesser pressures so as not to damage these.
- C. Pressure test piping system again after all equipment is installed at 50 psi for a minimum of one hour, or the maximum rated pressure of the weakest component, whichever is less.

- D. Submit written procedures for testing, including test pressures, equipment to be used and items to be tested.
- E. Notify the Authority in writing seven (7) days in advance of pressure tests. The Authority shall be present at all testing. Pressure testing performed without the Authority present will be rejected, unless prior written approval is received from the Authority.
- F. Cut out, re-weld and re-test all leaking welded joints. Repair any leakage found and retest until system proves leak-free. Retesting after the repair of defects shall be performed at no cost to the Authority.
- G. Certified test results shall be submitted to the Authority for approval. Test certification shall include gauge pressure, air temperature, time, date, witness, and pipeline identification.

3.6 SYSTEM STARTUP

- A. Prime equipment and piping prior to testing and verify operation as indicated in 23 12 13.

END OF SECTION

SECTION 23 12 13

FUEL AND LUBE OIL EQUIPMENT AND SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all interior and exterior fuel piping work.
- B. Section Includes:
 - 1. Fuel System Equipment.
 - 2. Day Tank.
 - 3. Hoses.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 11 13 - Fuel and Lube Oil Piping

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturers catalog literature including manufacturer's installation instructions for each item indicated on the Fuel System Equipment Schedule on Sheet M1.1.
 - 2. Submit manufacturer's catalog information hoses and all other items specified herein.
- C. Shop Drawings: Submit shop drawings for day tank fabrication.

1.4 CLOSEOUT

- A. Division 1 - Closeout Requirements.
- B. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

PART 2 – PRODUCTS

2.1 DIESEL FUEL SYSTEM EQUIPMENT

- A. Provide pumps, meters, filters, equipment, and appurtenances as indicated in the Diesel Fuel System Equipment Schedule on Sheet M1.1.

2.2 EMERGENCY VENT

- A. 3" size, aluminum body, cast iron cover, 3" FPT, 8 oz./sq in, Morrison Figure 244 or approved equal.

2.3 VENT CAP

- A. 2" size, aluminum body, stainless steel screen, 2" FPT, Morrison Figure 155 or approved equal.

2.4 DAY TANK

- A. Day Tank: Rectangular heavy gauge welded steel tank manufactured in accordance with UL standard 142 and design drawings, capacity and configuration as indicated. Furnish complete with all controls and accessories as indicated.

2.5 HOSES

- A. Fuel rated hose, Eaton Weatherhead H569 or approved equal. Sized as indicated on Drawings. Provide re-useable plated steel straight JIC swivel ends with NPT adapters.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Check equipment for damage that may have occurred during shipment. Repair damaged equipment as required or replace with new equipment.

3.2 PREPARATION

- A. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.

3.3 INSTALLATION

- A. Install pumps and associated equipment in accordance with applicable codes and per manufacturer's installation instructions.
- B. Install fuel oil day tank as indicated on Drawings.
- C. Electrical installation shall be in accordance with Division 26 Specifications.

3.4 SYSTEM STARTUP

- A. Prior to starting fuel pumps, prime cavities with lube oil then energize momentarily to verify proper rotation.
- B. Fuel Piping: Prime all piping, fill filters with diesel fuel, and bleed off air prior to starting pumps.
- C. Verify operation of all day tank controls including timer and level alarms.

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all glycol piping.
- B. Section Includes:
 - 1. Hydronic (coolant) piping.
 - 2. Unions and flanges.
 - 3. Valves.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for HVAC.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 21 16 - Hydronic Specialties.
- D. Section 26 32 13 – Engine Generators.

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.3 - Malleable Iron Threaded Fittings.
 - 2. ASME B16.4 - Gray Iron Threaded Fittings.
 - 3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 4. ASME B31.1 - Power Piping.
 - 5. ASME B31.9 - Building Services Piping.
 - 6. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International:
 - 1. ASTM A53B - Standard Specification for Pipe, Steel, Black and Hot-Dipped.
 - 2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
- C. American Welding Society:
 - 1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 - 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 - 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints.
- B. Provide flanges, unions, and couplings at locations requiring servicing. Use unions, flanges, and couplings downstream of valves and at equipment connections. Do not use direct welded connections to valves or equipment.
- C. Provide pipe hangers and supports in accordance with Drawings and specifications.
- D. Use ball valves or butterfly valves for shut-off and to isolate equipment where indicated.
- E. Use hose end drain valves with cap for drains where indicated.
- F. Flexible Connectors: Use flexible connectors and hoses where indicated.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit manufacturers catalog information for pipe materials, fittings, and accessories.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
- C. Welders' Certificate: Include welders' certification of compliance in accordance with Quality Assurance below.

1.6 CLOSEOUT

- A. Division 1 - Closeout Requirements

1.7 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Perform Work in accordance with ASME B31.1 and ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- C. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.
- D. Perform pipe welding with experienced welder with current API or equivalent certification for all pipe welding in all positions.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Fabricator or Installer: Company specializing in performing Work of this section with current certification.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 COOLANT PIPING

- A. Steel Pipe: ASTM A53B, welded black steel.
 - 1. 1-1/2 inch diameter and larger: Schedule 40.
 - 2. Smaller than 1-1/2 inch diameter: Schedule 80.
- B. Provide butt weld joints and fittings for all piping 1-1/2 inches in diameter and larger except where specifically indicated as threaded. Provide socket weld or threaded joints for all piping smaller than 1-1/2 inches using minimum 3000 lb. forged steel fittings.

2.2 UNIONS AND FLANGES

- A. Unions: Class 3000 minimum ASTM A105 forged steel threaded unions.
- B. Flanges: Class 150, flat face ASTM A235 seamless domestic carbon steel butt weld flanges for connection to flanged valves and equipment. Install full faced 1/8" thick nitrile rubber gaskets, Alaska Rubber or approved equal.

2.3 BALL VALVES

- A. Manufacturers:
 - 1. Hammond, Domestic only.
 - 2. Milwaukee, Domestic only.
 - 3. Apollo, Domestic only.
 - 4. Or approved equal.
- B. Minimum 200 PSIG WOG, bronze body, chrome plated bronze or brass ball, full port, TFE or Viton packing and seat ring, threaded ends, domestic only.

2.4 CHECK VALVES

- A. Threaded or soldered end as indicated and required, bronze body, swing check style, minimum 200 psig WOG rating. Domestic only. Milwaukee, Hammond or approved equal.

2.5 DRAIN VALVES

- A. Bronze body, 1/2" or 3/4" size and solder cup or MPT connection to match associated pipe, 3/4" male hose end with cap and jack chain. FNW 426D, 426F, 427D, or 427F or approved equal.

2.6 GAUGE COCK ISOLATION VALVE

- A. Brass body, MPT by FPT ends, T-handle, Legend Valve item 101-531 (1/4") or Item 101-532 (3/8"), or approved equal.
- B. Install on all pressure gauges, small hose connections, and where indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.2 PREPARATION

- A. Ream threaded pipe ends. Remove burrs. Thoroughly coat male pipe ends with Teflon based pipe joint compound prior to assembling.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION - PIPING SYSTEMS

- A. Install in accordance with manufacturer's instructions.
- B. Route piping parallel to building structure and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install pipe identification in accordance with Section 23 05 00.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide access where valves and fittings are not exposed.
- H. Slope hydronic piping and arrange systems to drain at low points and vent at high points.
- I. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 23 05 00.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Insulate piping as required by specifications; refer to Section 23 07 19.

3.5 TESTING

- A. Hydrostatically test all piping at 100 psig minimum for one hour with no noticeable water leaks or pressure drops except as caused by temperature change.
- B. Isolate engines and radiators prior to pressure testing.

3.6 FLUSHING

- A. Install conical “witch hat” strainers on inlets to radiators. Orient “witch hat” to collect debris inside cone. Run system to flush piping with fresh water until strainers do not pick up additional debris.
- B. Remove strainers and drain entire system.

3.7 SYSTEM START-UP

- A. After pressure testing and flushing, fill entire system with ethylene glycol. The solution shall be extended life (heavy duty) ethylene glycol, premixed to a ratio of 60% ethylene glycol to 40% treated water.

END OF SECTION

SECTION 23 21 16

HYDRONIC EQUIPMENT AND SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coolant System Equipment.
 - 2. Heating System Equipment.
 - 3. Sight gauge.
 - 4. Hoses.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for HVAC.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 21 13 - Hydronic Piping.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturers catalog literature including manufacturer's installation instructions for each item indicated on the Coolant System Equipment Schedule and the Heating Equipment Schedule on Sheet M1.1.
 - 2. Submit manufacturer's catalog information for hoses and all other items specified herein.
- C. Shop Drawings: Submit shop drawings for expansion tank fabrication.

1.4 CLOSEOUT

- A. Division 1 - Closeout Requirements.
- B. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing Work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept material on site in shipping containers with labeling in place. Inspect for damage.

- B. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Division 1 – Material and Equipment: Storage and Protection.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements before fabrication.

PART 2 - PRODUCTS

2.1 COOLANT SYSTEM EQUIPMENT

- A. Provide all equipment and appurtenances as indicated in the Coolant System Equipment Schedule on Sheet M1.1.

2.2 HEATING SYSTEM EQUIPMENT

- A. Provide heater with accessories in accordance with the Heating System Equipment Schedule on Sheet M1.1.

2.3 LIQUID LEVEL SIGHT GAUGE

- A. Borosilicate glass tube, aluminum body, Buna n seals, 1/2" MPT connections, 9" centers. Lube Devices G607-09-A-1-4 or approved equal.

2.4 HOSES

- A. Large (Engine Connection) Hoses: Sized as indicated on the Drawings. Wire reinforced corrugated silicone hose. Parker 6621 or approved equal. Install on barbed hose (king) nipples with stainless steel T-Bolt clamps, Nyco Supra W2, or approved equal.
- B. Small Hoses: Teflon hose with stainless steel outer braid, Eaton Weatherhead H243, or approved equal. Provided re-useable plated steel straight JIC swivel ends with NPT adapters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check equipment for damage that may have occurred during shipment. Repair damaged equipment as required or replace with new equipment.

3.2 INSTALLATION

- A. Install heater and accessories in strict compliance with manufacturer's instructions.
- B. Install piping system and appurtenances as indicated on Drawings.

3.3 CLEANING

- A. Clean and flush glycol system before adding glycol solution. See Section 23 21 13 - Hydronic Piping.

END OF SECTION

SECTION 23 31 13

METAL DUCTS AND VENTILATION EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Duct Materials.
 - 2. Fans.
 - 3. Dampers.
 - 4. Actuators.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 09 00 - Instrumentation and Control Devices.

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. Air Movement and Control Association International, Inc.: AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- C. National Fire Protection Association: NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- D. Sheet Metal and Air Conditioning Contractors: SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 PERFORMANCE REQUIREMENTS

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit data for duct materials and accessories.
 - 2. Submit manufacturers catalog literature for each item indicated on the Ventilation Equipment Schedule on Sheet M1.1.

3. Submit manufacturers catalog literature for dampers and actuators.
- C. Shop Drawings: Submit shop drawings for review prior to fabrication of ductwork. Note that if ductwork will be fabricated exactly as indicated on the design drawings the design drawings can be submitted in lieu of shop drawings.

1.6 CLOSEOUT

- A. Division 1 - Closeout Requirements.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible and International Mechanical Code.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealant.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having zinc coating in conformance with ASTM A90.
- B. Fasteners: Rivets, bolts, or sheet metal screws except where indicated as welded.

2.2 FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Interior Sheet Metal Fabrications: fabricate all damper and fan assemblies and ducts from minimum 20 gauge galvanized sheet metal using standard mechanical joints. Seal all joints airtight.
- C. Exterior Hood Fabrications: fabricate all exterior hoods from minimum 0.090" thick Type 5052 aluminum using welded joints.
- D. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.

1. Sealants, Mastics and Tapes: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
2. Do not provide sealing products not bearing UL approval markings.

2.3 CONTROL DAMPER

- A. Opposed blade low-leakage control damper, galvanized steel constructions, 304 stainless steel bearings and jamb seals, EPDM blades seals, Greenheck VCD-23 or approved equal. See fabrication details on Drawings for sizes.

2.4 ACTUATORS

- A. On duct dampers install 120V spring return actuator, Belimo AFBUP or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check equipment for damage that may have occurred during shipment. Repair damaged equipment as required or replace with new equipment.
- B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

- A. Fabricate and install ducts as indicated on Drawings and in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Verify proper operation of dampers.

END OF SECTION

SECTION 23 35 16.10
ENGINE EXHAUST AND CRANK VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Engine Exhaust piping
 - 2. Crank Vent piping
 - 3. Mufflers
 - 4. Flanges and Gaskets
 - 5. Crank Vent Hose

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 07 19 - Piping Insulation.
- D. Section 26 32 13 – Engine Generators.

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.1 - Power Piping.
 - 2. ASME B31.9 - Building Services Piping.
 - 3. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International:
 - 1. ASTM A53B - Standard Specification for Pipe, Steel, Black and Hot-Dipped.
- C. Underwriters Laboratories Inc.:
 - 1. UL 536 - Flexible Metallic Hose.

1.4 SYSTEM DESCRIPTION

- A. Provide piping of material as specified in PART 2.
- B. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.
- C. Provide flanges or couplings at locations requiring servicing and where indicated. Do not use direct welded connections to equipment.
- D. Provide pipe hangers and supports per Drawings and specifications.

- E. Flexible Connector: Use at exhaust piping connections to engine as indicated in Drawings.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit manufacturers catalog information for pipe materials, fittings, and accessories.
 - 2. Flanges and Gaskets: Submit manufacturer's catalog information with data and ratings for each service.
 - 3. Mufflers: Submit manufacturer's catalog information.
 - 4. Crank Vent Hose: Submit manufacturer's catalog information.

1.6 CLOSEOUT SUBMITTALS

- A. Division 1 - Closeout Requirements.

1.7 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- C. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Fabricator or Installer: Company specializing in performing Work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Division 1 - Material and Equipment: Transportation and Handling.
- B. Accept piping and materials 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.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 PIPING (EXHAUST, CRANK VENT, CHARGE AIR)

- A. Exhaust Pipe: ASTM A-53 black steel pipe, Schedule 40.
- B. Crank Vent Pipe: ASTM A-106B black steel pipe, Schedule 40.

- C. Provide butt weld joints and fittings. Use long radius elbows for exhaust and short radius elbows for charge air, elbow diameters to match piping.
- D. Perform pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

2.2 MUFFLERS

- A. Mufflers to be disc style, critical grade, with internal thermal insulation, EM Products DCK2, or approved equal.

2.3 FLANGES

- A. Exhaust flanges, slip-on ANSI 150# flat faced.
- B. Gaskets, high temperature, full face, Frenzelit Novatec 925F or approved equal.

2.4 FLEXIBLE CONNECTORS

- A. Exhaust Pipe Flexible Connectors: Furnished with Engine-Generator, see Section 26 32 13 – Engine-Generators.

2.5 CRANK VENT HOSE

- A. Crank Vent Hose: Heavy duty oil resistant PVC suction hose. Diameter and length as indicated. Tigerflex ORV or approved equal.
- B. Install on barbed hose (king) nipples with stainless steel T-Bolt Clamps Fasten with lined stainless steel T-bolt clamps, Nyco Supra W2, or approved equal

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.2 PREPARATION

- A. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Drawings and specifications. Refer to Section 23 05 29.

3.4 INSTALLATION - PIPING

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 23 05 00.
- E. Install identification on piping systems. Refer to Section 23 05 00.

- F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. Piping Insulation: Insulate interior exhaust piping as indicated on the Drawings.

3.5 INSTALLATION – MUFFLER

- A. Install muffler in accordance with manufacturer's installation instructions and as indicated on the Drawings.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Provide the labor, materials, equipment and test equipment necessary to furnish, install, and place into operation the power, motor, lighting, control, alarm, and associated electrical systems of this Contract. Connect motors, meters, panels, sensors, switches, and outlets or any other electrical device installed or provided as part of the project. Mark and identify circuits, terminal boards, equipment, enclosures, etc. with identification numbers, wire numbers, nameplates, and warning signs. Test, adjust and calibrate equipment and start-up all electrical equipment and its associated mechanical attachments as necessary to place the project into operation.
- B. Provide and install all control equipment and wiring to instruments and devices installed by others.
- C. Where the work of several crafts is involved, coordinate all related work to provide each system in complete and in proper operating order.
- D. Cooperate with all others involved in the project, with due regard to their work, to promote rapid completion.
- E. Local Conditions: The Contractor shall thoroughly familiarize himself with the work as well as the local conditions under which the work is to be performed. Schedule work with regard to seasons, weather, climate conditions, and all other local conditions which may affect the progress and quality of work.
- F. See Division 1 which contains information and requirements that apply to work specified herein.
- G. The Contractor shall provide electrical service to, connection and/or interconnection of various units of equipment supplied by others. The Contractor shall not be required to set in place or align motors or calibrate devices supplied as an integral part of equipment provided by others.

1.02 RELATED REQUIREMENTS

- A. This section applies to all Division 26 work.
- B. See Divisions 1, 23, 26, and 33 which contain information and requirements that apply to work specified herein.

1.03 TELEPHONE SERVICE

- A. Telephone service is not a part of this project.

1.04 CODES AND STANDARDS

- A. Codes: Perform all work in strict accordance with all applicable national, state, and local codes; including, but not limited to the latest legally enacted editions of the following specifically noted requirements:
 - 1. NFPA 70, National Electric Code – NEC.
 - 2. ANSI-C2, National Electrical Safety Code – NESC.
 - 3. International Building Code – IBC.
 - 4. International Fire Code - IFC.
- B. Standards: Reference to the following standards infers that installation, equipment, and materials shall be within the limits for which it was designed, tested, and approved, in conformance with the current publications and standards of the following organizations:
 - 1. American National Standards Institute – ANSI.
 - 2. American Society for Testing and Materials – ASTM.
 - 3. American Society of Heating, Refrigerating and Air Conditioning Consultants - ASHRAE (Standard 90-75).
 - 4. Factory Mutual – FM.
 - 5. Institute of Electrical and Electronics Consultants – IEEE.
 - 6. National Electrical Contractors Association – NECA.
 - 7. National Electrical Manufacturers' Association – NEMA.
 - 8. National Fire Protection Association – NFPA.
 - 9. Underwriters Laboratory - UL

1.05 SPECIFIC TERMINOLOGY.

- A. Streamlining: In many instances, the products, reference standards, and other itemized specifications have been listed without verbiage. In these cases, it is implied that the Contractor shall provide the products and perform in accordance with the references listed.
- B. The word "Contractor" as used in Division 26 specifications shall mean "Electrical Contractor."
- C. The word "General Contractor" as used in Division 26 specifications shall mean the Contractor responsible for the project.

- D. "Furnish" means to purchase material as shown and specified, and cart the material to an approved location at the site or elsewhere as noted or agreed to be installed by supporting crafts.
- E. "Install" means to set in place and connect, ready for use and in complete and properly operating finished condition, material that has been furnished.
- F. "Provide" means furnish all products, labor, sub-contracts, and appurtenances required and install to a complete and properly operating, finished condition.
- G. "Rough-in and Connect" means provide an appropriate system connection such as conduit with "J" boxes, wiring, switches, disconnects, etc., and all wiring connections. Equipment furnished is received, uncrated, assembled and set in place under the Division in which it is specified.
- H. "Accessible" means arranged so that an appropriately dressed man 6-foot 2 inches tall, weighing 250 pounds, may approach the area in question with the tools and products necessary for the work intended, and may then position himself to properly perform the task to be accomplished, without disassembly or damage to the surrounding installation.
- I. "Serviceable" means arranged so that the component or product in question may be properly removed and replaced without disassembly, destruction, or damage to the surrounding installation.
- J. "Product" is a generic term which includes materials, equipment, fixtures, and any physical item used on the project.

1.06 DRAWINGS, SPECIFICATIONS & SYMBOLS

- A. The Plans and Specifications are complementary; what is shown on one is as binding as if called for in both. Do not scale the Plans. Locations of devices, fixtures, and equipment are approximate unless dimensioned.
- B. The Plans are partly diagrammatic and do not show precise routing of conduits or exact location of all products, and may not show in minute detail all features of the installation; however, provide all systems complete and in proper operating order.
- C. Drawing symbols used for basic materials, equipment and methods are commonly used by the industry and should be universally understood. Special items are identified by a supplementary list of graphical illustrations, or called for on the Plans or in the specifications.

1.07 SUBMITTALS, MANUALS AND SHOP DRAWINGS

- A. Submittals: Provide submittals for all products and systems described in Divisions 26 and 33 specifications and shown on the Plans to demonstrate compliance with the requirements of the project. Furnish submittals in the

manner described herein, and in Division 1. In addition, include data for review, and organize data, as noted below:

1. Specific reference and/or drawings reference for which literature is submitted for review with an index, following specification format, and item by item identification.
 2. Manufacturer's name and address, and supplier's name, address, and phone number.
 3. Catalog designation or model number with rough-in data and dimensions.
 4. Operation characteristics.
 5. Complete customized listing of characteristics required. Indicate whether item is "As Specified" or "Proposed Substitution." Indicate any deviations on submittal. Mark out all non- applicable items. The terminology "As Specified" used without this customized listing is not acceptable.
 6. Wiring diagrams for the specific system.
 7. Coordination data to check protective devices.
 8. Working construction Drawings (Shop Drawings).
- B. Submittal Data:
- a. Individual Special Systems (Control Panels, reclosers, vacuum switches, etc.)
 - b. Meters.
 - c. Transformers.
 - d. Potential and current transformers.
 - e. Electrical Utilities material and equipment.
 - f. Lighting Fixtures, Lamps and Accessories
 - g. Service Disconnects.
 - h. Raceways, Fittings, and Supports.
 - i. Conductors.
 - j. Wire and Cable.
 - k. Wiring Devices.
 - l. Additional items that may be listed on the Schedules or specified on the drawings.

9. Submittal review is for general design and arrangement only and does not relieve the Contractor from any of the requirements of the Contract Documents. Submittals will not be checked for quantity, dimension, fit or proper technical design of manufactured equipment. Where deviations of substitute product or system performance have not been specifically noted in the submittal by the Contractor, provision of a complete and satisfactory working installation of equal quality to system specified is the sole responsibility of the Contractor.

1.08 TESTS

- A. Division 1 – Contract Closeout.
- B. The Contractor shall be responsible for field testing all station service and other electrical systems and equipment shown on the drawings. Testing of the generators and switchgear will be performed by the AUTHORITY after substantial completion.
- C. The Contractor shall prepare and submit a test plan for review and approval by the AUTHORITY.
 1. Field testing cannot take place without an approved test plan.
 - a. The Test Plan shall outline the tests planned for each item of equipment.
 - b. The Test Procedures shall identify the test equipment to be utilized, the action of each test step and the expected result so that a test technician who has no knowledge of the details of the equipment design shall be able to successfully conduct the test.
 2. In the presence of the AUTHORITY,
 - a. Test the equipment and electrical circuits for proper connection, continuity, and absence of undesirable shorts and grounds.
 - b. Test wire and cable installation, when complete.
 - c. Check for continuity, visual damage, marking, and proper phase sequence before performing insulation testing.
 - 1) Megger bus work, switches, breakers and circuits phase-to-phase and phase-to-ground disconnecting and reconnecting equipment which cannot be meggered otherwise.
 - 2) The minimum acceptable steady-state value is 50 megohms. Ambient temperature and humidity during testing shall be recorded.
 3. Verify operation, calibration, and settings of the meters, relays and indicating devices.

4. Check all auxiliary equipment, i.e., heaters, thermostats, lights, and all illuminated indicating devices and lamps, and all audible alarm devices to verify that they function properly.
 5. Take station service equipment test load readings after all loads are connected. Obtain the maximum reading for each phase and neutral with all lighting, appliances, motors (as applicable use largest combination), and other loads connected to the panels in service.
 6. Check fuses with an ohmmeter; ring out wiring and busing; check operation of control and safety interlocks.
 7. Test motor driven equipment motors before energization. Insulation test shall consist of megohmmeter check phase-to-ground, per IEEE Standard 43 or manufacturer's recommendations.
 8. Load test each motor of motor driven equipment showing the following:
 - a. Nameplate ratings (horsepower), (speed), (voltage), (phase), (ampere rating of motor at full load).
 - b. Measured load in amperes on lines 1-2.
 9. Load test pump motors, noting the operating conditions at the time of the test. Motor test data shall show suction and discharge conditions (pressure, temperature, humidity, to where such conditions affect load).
 10. Overload heaters shall be checked and the size on each phase shall be noted at this time on the test sheet.
- D. Report all test results in writing. Where tests disclose problem areas, retest after the defect has been corrected.
- E. Demonstrate that the electrical installation is working by operating all electrical systems and equipment. Simulate control inputs, responses to outputs and alarm conditions and their acknowledgement, artificially where necessary, for complete system tests.
- F. Operate the electrical systems until acceptance of the work. Instruct operators in the correct operation of all electrical and control systems under your jurisdiction.
- G. Any rework or repair of equipment required during or as a result of the testing shall be done by the Contractor at no additional expense to the AUTHORITY.
- H. The Contractor shall furnish to the AUTHORITY at the time the project is accepted, any special tools, calibration equipment, and testing apparatus specified or furnished by the equipment manufacturer for the proper adjustment and maintenance of the electrical equipment provided.

1.09 CODES AND INSPECTIONS

- A. Electrical work shall be installed in accordance with the latest edition of the National Electric Code and local and state codes in legal force in the project area.
 - 1. If the Contractor observes that the Plans and/or Specifications are at variance with such codes and regulations, he shall promptly notify the AUTHORITY in writing.
 - 2. Should the Contractor perform any work in non-compliance with the above-mentioned codes and regulations without such notice to the AUTHORITY, the Contractor shall bear all costs arising therefrom.
- B. The above codes are referenced to establish minimum requirements and wherever this specification requires higher grades of material or workmanship than required by the codes, this specification shall prevail.
- C. All electrical work shall be performed by Alaska licensed Journeyman Electricians or licensed Apprentice Electricians under the direct supervision of a licensed Electrical Administrator.
- D. Submit written proof of all Journeyman and Apprentice Electricians' current licenses.
- E. Submit certification for tests and inspections required by the electrical inspector having jurisdiction. Certificates of approval that are issued shall be transmitted to the AUTHORITY.
- F. The Contractor shall pay all costs and fees required by inspecting and other agencies required for his work.
- G. Cooperate with the AUTHORITY and provide assistance at all times for the inspection of the electrical work performed under this Contract. Remove covers, operate machinery, or perform any reasonable work which, in the opinion of the AUTHORITY, will be necessary to determine the completeness, quality, or adequacy of the work.

1.10 COORDINATION

- A. Electrical Plans are partly diagrammatic and it is not the intent to show in detail all features of work or exact physical arrangement of equipment. The location of outlets and equipment are approximate unless dimensioned. The exact locations and routing of conduits shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance.
- B. If conduit is placed incorrectly with respect to equipment connections or if equipment connections are relocated without appropriate changes in the electrical work, and the resulting work is not coordinated, the work affected shall

be removed and re-installed at the Contractor's expense, even if removal and replacement of structural and/or mechanical parts of the work are necessary.

- C. The Contractor shall schedule his work to coordinate through the General Contractor and with all other subcontractors, power and telephone utilities in order to maintain job progress and to avoid conflicts with equipment installation or work done by the various trades.
- D. The Contractor is responsible for maintaining required clearspace. Should the Contractor become aware of a clearspace violation or if the installation of electrical equipment as shown produces a clear pace violation, notify the AUTHORITY in writing before proceeding with the installation.

1.11 LOCATIONS.

- A. If hazardous location boundaries exist, they will be shown on the drawings. Locations for seal-off fittings shall be field determined by the Contractor.
- B. Wet Locations: Wet locations shall include all areas underground (below grade), in direct contact with the earth, areas subject to saturation with water or other liquids from splashing, surface water, exposed to the weather and unprotected.

1.12 RECORD DRAWINGS

- A. Division 1 – Project Record Documents.
- B. Reference requirements stated elsewhere in these specifications.
- C. In addition to other requirements, mark up a clean set of Plans as the work progresses, to show the dimensioned location and routing of all electrical work which will become permanently concealed. Show routing or work in permanently concealed blind spaces within the facility. Show complete routing and sizing of any significant revisions to the systems shown.
- D. Maintain Record drawings in an up-to-date fashion in conjunction with the actual progress of installation. "Record" progress mark-ups shall be available on-site for examination by the AUTHORITY at all times.
- E. Prepare wiring diagrams on reproducible media using AutoCAD V.2012 or later for all individual special systems as installed. Identify all components and show all wire and terminal numbers and connections.
- F. Prior to substantial completion, deliver these drawings and their electronic files in both .dwg and full size .pdf format to the AUTHORITY and obtain a written receipt.

1.13 OPERATING INSTRUCTIONS

Prior to final acceptance, instruct operators on the proper operation and maintenance of all electrical systems and equipment under this contract. Make available a qualified technician for each component of the installation for this instruction. Give these

operating instructions after the operation and maintenance manuals have been furnished to the AUTHORITY.

1.14 OPERATION AND MAINTENANCE MANUALS

- A. Provide Operation and Maintenance Manuals in the manner described elsewhere in these specifications. In addition, organize manual and include data and narrative as noted below. Submit in accordance with Division 1.
- B. Provide a separate chapter for each section of the electrical specifications with subchapters for each class of equipment or system. Provide a table of contents for each chapter, and each major item in each chapter, to indicate the page number of each. Label all pages to assure correct placement in manual. Identify each piece of equipment with its associated nameplate number, i.e. pump P-1A, etc.
- C. Operating Sequence Narrative:
 - 1. In each chapter, describe the procedures necessary for personnel to operate the system and equipment covered in that chapter.
 - 2. Describe procedures for start-up, operation, emergency operation and shutdown of each system. If a particular sequence is required, give step-by-step instructions in that order.
 - 3. Describe all seasonal adjustments which should be accomplished for each system.
 - 4. Provide the above descriptions in typewritten, simple outline, narrative form.
- D. Maintenance Instructions:
 - 1. Provide complete information for preventive maintenance for each product, including recommended frequency of performance for each preventive maintenance task.
 - 2. Provide all information of a maintenance nature covering warranty items, etc., which have not been discussed in the manufacturer's literature or the operating sequence narrative.
 - 3. Provide complete informational data for all the spare and replacement parts for each product and system. Properly identify each component by part number and manufacturer.
- E. Manufacturers' Brochures: Include manufacturers' descriptive literature covering all products used in each system, together with illustrations, exploded views and renewal parts lists. Highlight all applicable items and instructions, or mark-out non-applicable items. Brochure bearing submittal review stamp are not acceptable.

- F. Shop Drawings: Provide a copy of all corrected, approved shop drawings for the project either with the manufacturers' brochures or properly identified in a separate subsection.

1.15 INSTRUCTION OF OPERATING PERSONNEL

- A. Provide services of qualified representative of supplier of each item or system listed below to instruct operators in operation and maintenance of item or system.
- B. Make instruction when system is complete of number of hours indicated, and performed at time mutually agreeable.
 - 1. Electrical Distribution Equipment: 2 hours
 - 2. Alarm and Control Panels: 2 hours per panel
- C. Have approved operating and maintenance data, and parts lists for all equipment on hand at the time of instruction.

1.16 PROJECT COMPLETION AND DEMONSTRATION

- A. Division 1 – Contract Closeout.
- B. Tests: During final inspection, conduct operating tests for approval.
- C. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents. Should a 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.
- D. Have instruments available for measuring, voltage and current values and for demonstration of continuity, ground, or open circuit conditions. Furnish personnel to assist in taking measurements and making tests.
- E. In the event that systems are not complete and fully operational at the time of Final Inspection, all costs of any subsequent inspections shall be borne by the Contractor at no additional cost to the AUTHORITY.

1.18 CERTIFICATE OF COMPLETION

- A. Submit, at time of request for Final Inspection, a completed letter in the following format:

I, _____(Name), of _____(Firm), certify that the Electrical Work is complete in accordance with Contract Plans and Specifications, and authorized change orders (copies of which are attached hereto), and will be ready for Final Inspection as of _____(Date). I further certify that the following Specification requirements have been fulfilled:

- 1. Megger readings performed, ____ copies of log attached.

2. Operating manuals completed and instructions of operating personnel performed_____ (Date).

_____(Signed)
Alaska Energy Authority

3. Record drawings up-to-date and ready to deliver to the AUTHORITY.
4. Emergency systems tested and fully operational.
5. All other tests required by Specifications have been performed.
6. All systems are fully operational. Project is ready for Final Inspection.

SIGNED:_____ DATE:_____

TITLE:_____

PART 2 – MATERIALS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 26 05 02

BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Section describes specific requirements, products, and methods of execution which are typical throughout the Electrical Work of this Project. Additional requirements for the specific systems will be found in the Division specifying those systems.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. All other Division 1, 23, 26, and 33 Specifications

1.03 COORDINATION

- A. Layout all the work in advance and avoid conflict with other Work in progress. Physical dimensions shall be determined from Civil and Structural plans. Verify locations for junction boxes, disconnect switches, stub-ups, etc., for connection to equipment furnished by others, or in other Divisions of this Work.

1.04 SERVICEABILITY OF PRODUCTS

- A. Furnish all products to provide the proper orientation of serviceable components to access space provided.
- B. Coordinate installation of all products to allow proper service areas for any items requiring periodic maintenance inspection or replacement.
- C. Replace or relocate all products incorrectly ordered or installed.

1.05 ACCESSIBILITY OF PRODUCTS

- A. Arrange all work to provide access to all serviceable and/or operable products. Layout work to optimize net usable access space within confines of space available. Advise the AUTHORITY, in a timely manner, of areas where proper access or required clearspace cannot be maintained. Furnish Layout Drawings to verify this claim, if requested.
- B. Provide access doors in ceilings, walls, floors, etc., for access to j-boxes, automatic devices, and all serviceable or operable equipment in concealed spaces.

PART 2 – PRODUCTS

2.01 PRODUCTS FURNISHED IN DIVISION 26

- A. All products furnished and installed in permanent construction shall be new, full-weight, standard in every way, and in first class condition.

- B. All equipment furnished by the Contractor shall be listed by and shall bear the label of Underwriters' Laboratories, Incorporated, (UL) or of an independent testing laboratory acceptable to the local Code- enforcement agency having jurisdiction.
- C. Products shall be identical with apparatus or equipment which has been in successful operation for at least two years. All products of similar class or service shall be of one manufacturer.
- D. Capacities, sizes, and dimensions given are minimum unless otherwise indicated. All systems and products proposed for use on this project shall be subject to review for adequacy and compliance with Contract Documents.

2.02 PRODUCTS FURNISHED IN OTHER DIVISIONS

- A. Controls, including conduit, wiring, and control devices required for the operation of systems furnished in other Divisions shall be installed in accordance with Division 26 Specifications.
- B. All equipment furnished by the Contractor shall be listed by and shall bear the label of Underwriters' Laboratories, Incorporated (UL) or of an independent testing laboratory acceptable to the local Code-enforcement agency having jurisdiction.
- C. All work on the project that falls under the jurisdiction of the electrical trade shall be performed by Licensed Electricians in possession of Alaska State Fitness Cards in conformance with the Electrical Specifications.
- D. Provide complete power connections to equipment including but not limited to feeders, connections, disconnects and motor running overcurrent protection. Where starters are provided as part of a packaged product, overcurrent heaters shall be provided.

2.03 IDENTIFICATION

- A. Equipment Labels and Nameplates:
 - 1. Provide rigid engraved labels and nameplates of laminated plastic 1/16-inch thick with white letters on a black or gray background. Label for emergency equipment shall be red with white letters.
 - a. Securely attach labels with two screws, minimum, per label, unless rating of panel is affected, use epoxy.
 - b. Temporary markings not permitted on equipment. Repaint trims housings, etc., where markings cannot be readily removed. Refinish defaced surfaces.
 - c. No labeling abbreviations will be permitted without prior approval.
 - 2. Label and Nameplate Locations:
 - a. Provide 1/2-inch minimum height letters on following equipment:

- 1) Service disconnects (red background).
 - 2) Secondary feeder breakers in distribution equipment. Designation as required by load served.
 - 3) Special equipment housed in cabinets, as designated on plans, on outside of door.
- b. Provide 1/4-inch minimum height letters on:
- 1) Disconnects and starters for motors or fixed appliances - (include item designation and branch feeder circuit number); and
 - 2) Designated electrical equipment.
- B. Branch Circuit Panelboard Schedules: Provide neatly typed schedule (odd numbered circuits on left side or top, even on right side or bottom) under plastic jacket or protective cover to protect the schedule from damage or dirt. Securely mount on inside face of panelboard door. Define briefly, but accurately, nature of connected load (i.e., Lighting, interior; receptacles, work bench; etc.) as approved.
- C. Empty Conduits: Provide tags with typed description of purpose, and location of opposite end, wired to each end of conduits provided for future equipment.
- D. Conduits: Mark all conduits entering or leaving panels with indelible black magic marker with the circuit numbers of the circuits contained inside.
- E. Junction Boxes: Mark the circuit numbers of wiring on all junction boxes with steel covers. Mark with indelible black marker.
- F. Conductors:
1. Conductors shall be color coded as indicated on the Electrical Conductor Schedule on Sheet E6.1.
 2. Control and alarm circuit conductors
 - a. Field conductors shall be identified by destination panel and terminal block designations.
 - b. Internal (Control Panel) numbering system shall be provided by the Contractor. The numbering system shall assign each logical conductor set a unique identification number that will be reflected on the as-built drawings.

PART 3 – EXECUTION

3.01 STORAGE AND HANDLING

- A. Division 1 – Material and Products.
- B. All items shall be delivered and stored in original containers, which shall indicate manufacturer's name, the brand, and the identifying number.
- C. Items subject to moisture and/or thermal damage shall be stored in a dry, heated place.

- D. All items shall be covered and protected against dirt, water, chemical and/or mechanical damage.

3.02 PROTECTION OF PRODUCTS

- A. The Contractor shall be held responsible for products to be installed under this Contract.
- B. The Contractor will be required to make good, at his own cost, any injury or damage which said products may sustain before Final Acceptance.

3.03 INSTALLATION

- A. All products shall be installed by skilled craftsmen. The norms for execution of the work shall be in conformity with NEC Chapter 3 and the NECA "Standards of Installation," which herewith is made part of these Specifications.
- B. Provide working space in accordance with NEC 110.26 to permit ready and safe operation and maintenance of equipment.
- C. Repair all surfaces and furnish all required products and labor to maintain fire-proof, air-tight and water- proof characteristics of the construction.
- D. Installation of all equipment shall be in accordance with manufacturer's instructions.

3.04 SUPPORT SYSTEMS

- A. All interior materials used shall be galvanized or zinc plated.
- B. All exterior materials used shall be hot dip galvanized steel. Where support elements are field cut, exposed metal shall be coated with spray-on galvanizing.
- C. Support from structure only.
- D. Conduits shown to be run at grade shall be supported by wood sleepers as shown on the drawings. Conduits may share fuel piping sleepers if installed such that neither system will require removal during maintenance or replacement.

3.05 MOUNTING HEIGHTS

- A. Mounting heights shall be above finished floor (AFF) or above finished grade as noted below, unless otherwise shown or indicated.
 - 1. Lighting Switches, 48 inches to center
 - 2. Receptacles shall be mounted as indicated on the Drawings.
- B. Other mounting heights are indicated on the Drawings by detail.

3.06 CUTTING AND PATCHING

- A. Obtain written permission from the AUTHORITY before cutting or piercing structural members.
- B. Sleeves through walls shall be galvanized iron pipe, flush with walls or ceilings, sized to accommodate the raceway. Interstitial space around conduit passing

through sleeves shall be filled with non-hardening duct sealant. No penetrations shall be made in or through the floor.

3.07 PROTECTIVE FINISHES

- A. Take care not to scratch or deface factory finish on electrical apparatus and devices. Repaint all marred or scratched surfaces.
- B. Provide hot dip galvanized components for ferrous materials exposed to the weather.

3.08 CLEAN-UP AND COMMISSIONING

- A. Throughout the Work, the Contractor shall keep the work area reasonably neat and orderly by periodic clean-ups.
- B. As independent parts of the installation are completed, they may be commissioned and utilized during construction.

3.09 WARRANTY

- A. Unless otherwise specified, the Warranty starts on the date Written Notice is given that the project is complete and all required corrections have been made. Warranty shall certify that all defects in products or workmanship shall be promptly repaired or replaced by the Contractor, to the satisfaction of the AUTHORITY, for a period of one year, except when, in the opinion of the AUTHORITY such failure is due to neglect or carelessness by the AUTHORITY.

3.10 OPERATIONAL INSTRUCTIONS

- A. The Contractor shall instruct operators in the operation of the products shown and/or specified.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This section describes general requirements, products, and methods of execution relating to the furnishing and installation of a grounding system complete as required for this project.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Materials and Methods

1.03 MINIMUM REQUIREMENTS

- A. The minimum requirement for the system shall conform to Article 250 of the NEC.

1.04 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.

PART 2 – PRODUCTS

2.01 GROUND CONNECTIONS

- A. All underground ground connections shall be made with exothermic welds.
- B. Grounding conductor connections to building structure and generator skids shall be made with mechanical lugs as indicated.

PART 3 – EXECUTION

3.01 SERVICE AND STRUCTURE GROUND

- A. Provide Service Ground.
- B. Create a Grounding Electrode System (GES) for this project by connecting the following:
 - 1. Grounding grid as shown on the Drawings.
 - 2. Generators, switchgear, and transformers grounded as shown on the Drawings.
 - 3. The neutral conductors grounded only where specifically indicated on the Drawings.
 - 4. Other items or equipment as indicated on the Drawings.

5. Current carrying capacity of the grounding and bonding conductors shall be in conformity with Tables 250.66 and 250.122 of the NEC.
- C. All structure bonding shall be in accordance with manufacturer's recommended practice.

3.02 EQUIPMENT GROUND

- A. The raceway system shall be bonded in conformity with NEC requirements to provide a continuous ground path. Where required by code or where called for on the Plans, an additional grounding conductor shall be sized in conformity with Table 250.122 of the NEC.
- B. Provide a separate copper equipment grounding conductor for each feeder and for each branch circuit indicated. Install the grounding conductor in the same raceway with the related phase and neutral conductors, and connect the grounding conductor to pull boxes or outlet boxes at intervals of 100 feet or less. Where paralleled conductors in separate raceways occur, provide a grounding conductor in each raceway. Connect all grounding conductors to bare grounding bars in panel boards, and to ground buses in service equipment to the end that there will be an uninterrupted grounding circuit from the point of a ground fault back to the point of connection of the equipment ground and system neutral. All grounding conductors shall be sized in conformity with Table 250.122 of the NEC.
- C. Provide separate grounding conductor securely bonded and effectively grounded to both ends of all non-metallic raceways and all flexible conduit.
- D. If non-metallic enclosures are provided, all metal conduits terminating or entering the enclosure shall be bonded together with approved bonding bushings and #6 AWG copper cable.

3.03 FENCE GROUNDING

Ground all chain link fencing as indicated on the AVEC Fence Grounding Reference Drawing 2-00-1504.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Support and align raceways, cabinets, boxes, fixtures, etc., in an approved manner and as specified.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Materials and Methods
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Support raceways on approved types of wall brackets, ceiling trapeze hangers, or malleable iron straps.
 - 1. Unistrut, B-Line, Grinnell, or equal.
 - 2. Plumbers perforated strap not permitted as means of support.
 - 3. Support used for exterior equipment shall be hot dip galvanized.
- B. Earthquake anchorages:
 - 1. Anchor equipment weighing more than 100 pounds to the building structure to resist lateral earthquake forces.
 - 2. Total lateral (earthquake) force shall be 1.00 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.
 - 3. Provide equipment supported by flexible isolation mounts with earthquake restraining supports positioned as close to equipment as possible without contact in normal operation (earthquake bumpers). The maximum lateral displacement due to the computed earthquake force from above shall not exceed 1.5 inches. Floor mounted equipment weighing less than 2000 pounds may have one 6-inch by 6-inch by 3/8-inch by 18-inch steel angle

bolted to the floor with four 5/8-inch diameter bolts placed on each of four sides of the equipment.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Conduits and equipment shall be mounted using strut or similar supports unless otherwise noted.
- B. Do not strap conduits to piping. When run in parallel with piping maintain adequate separation to allow maintenance to take place on either piping or conduit system so that the other does not have to be removed when maintenance is required.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This section describes specific requirements, products, and methods of execution relating to conduit and conduit fittings approved for use on this project. Type, size and installation methods shall be as shown on the Plans, required by Code and specified in these specifications.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Materials and Methods
- C. Section 26 05 26 Grounding and Bonding for Electrical Systems

1.03 QUALITY ASSURANCE

- A. Conduit and conduit fittings shall be standard types and sizes as manufactured by a nationally recognized manufacturer of this type of materials and be in conformity with applicable standards and UL listings.

1.04 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.

PART 2 – PRODUCTS

2.01 GALVANIZED RIGID CONDUIT (GRC)

- A. Galvanized rigid conduit shall be mild steel with continuous welded seam, hot-dip galvanized complying with ANSI C80.1 and shall be UL listed.
- B. Elbows, bends, and fittings shall be made of full weight materials complying with the above and shall be coated and threaded the same as conduit.
- C. Threads for conduit shall be tapered and clean cut. All threads shall be hot dip galvanized after cutting.
- D. Conduit shall be 1/2-inch trade size or larger and shall be manufactured by Allied Tube and Conduit Corp., Triangle PWC, Inc., or approved equal.

2.02 ELECTRICAL METALLIC TUBING (EMT)

- A. Steel tubing, galvanized outside and provided with a slick corrosion resistant interior coating; UL listed and labeled according to Standard 797; conforming to ANSI Standard C80.3.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Liquidtight flexible conduit shall be manufactured from galvanized steel strip, sealed with a polyvinyl outer jacket and shall be UL listed.
- B. Fittings shall be designed for use with liquidtight flexible conduit and shall maintain electrical continuity throughout fittings and conduit.
- C. Liquidtight flexible metal conduit shall be 1/2-inch trade size or larger and shall be manufactured by O-Z/Gedney Co., Southwire Co., or approved equal.

2.05 FITTINGS

- A. Expansion fittings shall be O.Z. type AX, EX, EXDS, TX, or EXE; Crouse Hinds type XJ; or approved equal.
- B. Fittings utilized with rigid steel shall be galvanized steel. Conduit bushings shall be of the insulated type. Where grounding bushings are required, insulated grounding bushings with pressure type lugs shall be provided. Lock rings shall be of the sealing gland type. Provide conduit bushings on all penetrations without hubs.
- C. Couplings and Terminations for Electrical Metallic Tubing (EMT): Join lengths of EMT with steel compression type couplings and connectors. The connectors shall have insulated throats or a smooth interior so as not to damage the insulation during pulling operations.
- D. Fittings for liquid-tight flexible conduit shall be steel or malleable iron, of a type incorporating a threaded grounding cone, nylon or plastic compression ring, and a tightening gland, providing a low resistance ground connection. All throats shall be insulated.

2.06 WIREWAY

- A. Interior Use: UL listed; NEMA 1, enamel finished; hinged covers except where indicated otherwise. Furnish complete with all fittings, couplings, hangers and accessories; Hoffman, B-Line or equivalent.

PART 3 – EXECUTION

3.01 CONDUIT USAGE

- A. INTERIOR - All interior locations shall be electrical metallic tubing (EMT) except where specifically indicated as wireway.
- B. EXTERIOR - All exterior above grade locations shall be galvanized rigid conduit (GRC) as indicated on the Drawings.
- D. Liquidtight flexible metal conduit shall be used in lengths 18 to 24 inches for connections to motors or equipment subject to vibration and where indicated on the Drawings. Longer lengths may be used for equipment connection if grounding conductor is installed through conduit.

3.02 CONDUIT INSTALLATION, GENERAL

- A. Conduit field joints shall be cut square and reamed smooth. Threads shall be cleanly cut and joints drawn up tight. Running threads shall not be permitted.
- B. After cutting and threading exterior GRC, threads shall be cleaned and degreased and shall receive two coats of cold galvanizing compound.
- C. Offsets and bends shall be made carefully, without reducing cross sectional area, and shall not be less than the radius of standard elbows.
- D. Convenience outlets, switches, and other devices located on walls shall be serviced from above, unless otherwise indicated.
- E. Raceways penetrating vapor barriers or traversing from warm to cold areas shall be sealed (at the penetration point) with a non-hardening duct sealing compound to prevent the accumulation of moisture.
- F. All metal conduits shall have insulating bushings and shall have locknuts inside and outside of enclosure box, etc. Conduits smaller than 1-1/4-inch trade size shall be equipped with bushings and shall have locknuts inside and outside of enclosure.
- G. All conduit runs shall be grounded in an effective and approved manner at point of origin and shall maintain a continuous ground throughout all runs, cabinets, pull boxes, and fittings from point of service to all outlets.
- H. Conduit Supports:
 - 1. Support conduits by wall brackets, pipe straps and strut sections, or trapeze hangers spaced not more than 10 feet on center.
 - 2. Conduits shall be supported from the structural system. Provide additional support as required for junction and pull boxes.
- J. All conduit runs shall be completed and cleaned free from foreign matter inside before conductors are drawn in. After installation conduit ends shall be plugged or capped to prevent the entrance of foreign materials.
- K. All conduits not used by this Contract shall have a pull wire installed and securely tied off at each end for future conductor installation.

END OF SECTION

SECTION 26 23 00

LOW-VOLTAGE SWITCHGEAR

PART 1 - GENERAL

1.1 SCOPE

- A. The Work included herein shall consist of providing design, drawings, materials, and accessories as specified herein for switchgear to be used to operate the standby diesel generator. The Work included herein shall consist of, but not be limited to, designing, fabricating, providing, and factory testing complete switchgear as specified herein.
- B. The switchgear shall be capable of automatic and manual operation as described herein. The switchgear shall be a fully coordinated system that provides the functions and features as specified herein.
- C. Electrical project design drawings shall be used in the design of the switchgear.
- D. The specifications and drawings are complementary. What is shown on one is binding whether or not it is shown or specified in the other. Failure to check both the drawings and specifications will not be grounds for a change order if additional equipment or material is required to be provided by the Contractor after the Engineer reviews the drawings, or deficiencies are identified during testing, either in the Factory or the field.
- E. The Contractor shall provide a complete and operational system as specified herein. Certain components are identified in these specifications to be provided by the Contractor. However, the components identified shall not be construed to be the complete list of components required for the successful operation of the system as specified. The Contractor shall provide all components and design required for the complete and successful operation of the system, conforming to all of the requirements specified herein, whether the components are identified or not. The Contractor shall ensure that all devices are installed and operate within their intended purposes. The Contractor shall check all catalog numbers indicated and shall coordinate all devices installed.
- F. The switchgear shall be provided with an Ethernet system for interconnection with the remote Togiak Power Plant SCADA system, as specified herein. A wireless Ethernet bridge will be installed separately from the switchgear.
- G. The Contractor shall fully test the switchgear separately from the generating equipment as specified herein.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Materials and Methods
- C. Section 26 32 13 Engine Generators

1.3 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 - Submittals and Section 01 33 23 - Shop Drawings, Product Data, and Samples.
- B. Provide complete and accurate shop drawings of the equipment including outline drawings and dimensional data which fully describe the height, width, and depth of the equipment; cabinet construction; one-line and three-line diagrams; schematics; wiring diagrams, and other relevant details.
- C. The one-line diagram shall show all breakers, protective devices, and control devices and shall use standard ANSI symbols.
- D. The drawings shall show the switchgear layout, shall show all terminal blocks and all connections between terminal blocks, auxiliary switch contacts, control devices, instrumentation, protection devices, etc. Drawings shall also show all details of enclosure construction.
- E. Provide a bill of material for all equipment or material provided as part of the switchgear.
- F. Provide manufacturer's catalog literature for all accessories and equipment.

1.4 QUALITY ASSURANCE

- A. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practices. Equipment shall not have been in service any time prior to delivery, except as required by testing.
- B. The paralleling switchgear shall comply with the requirements of the National Electrical Code for Essential Electrical Systems. The switchgear shall be listed as an assembly under UL Standard 891 for switchboards or equivalent independent testing laboratory standard recognized by the State of Alaska. A nameplate indicating the listing shall be permanently affixed to each section of the switchgear.
- C. The switchgear shall also be assembled and tested in strict accordance with the applicable standards of UL 891, UL 508A, NEC, ANSI, IEEE and NEMA, for metal enclosed low voltage switchgear.
- D. Solid-state circuitry shall meet or exceed the Transient Overvoltage Withstand Test per NEMA ICS1-109 and the Surge Withstand Capability Test (SWC) per IEEE Standard 472 (ANSI C37.90A). In addition, where UL Standards exist for components, devices and/or assemblies, such standards shall apply.

1.5 MANUFACTURER QUALIFICATIONS

- A. The switchgear shall be designed and assembled by a qualified fabricator (Fabricator) who is regularly engaged in the business of providing generation switchgear. The Fabricator shall provide documentation to demonstrate experience and competence.
- B. At the time of bid submittal, the Fabricator shall have current authorization from a third party listing agency to provide listed switchgear as required by the specifications. Evidence of authorization may be requested by the Authority after the bid opening in order to verify Fabricator qualifications.

1.6 CONTRACTOR WARRANTIES

- A. The Contractor shall warrant the work for a period of not less than one-year after energization of the equipment. In the event of equipment or component failure during the warranty period, the Contractor shall replace such defective equipment or components and bear all associated costs. The Contractor shall pursue manufacturer's warranties to the extent necessary to obtain replacement equipment and provide proof of action taken upon request. Assist Owner as directed in determining cause of failure.
- B. The warranty shall state in clear terms exactly what warranty coverage the seller provides, for each unit and attachments. This shall include the terms, length of coverage, reporting responsibilities, how the warranty applies to accessory equipment, restrictions, locations of local facilities for handling warranty and other repairs (including contact names), and any other available information pertaining to warranty.
- C. Provide a nametag on each piece of equipment that clearly identifies the party responsible for the warranty. Nametag shall include the name, address, and phone number, and shop order or Fabricator's serial number.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Provide an operation and maintenance (O&M) manual for the switchgear. The O&M manual shall be furnished in a single PDF file organized by sections with tabs and bookmarks.
- B. Include the following information in the O&M manual:
 - 1. Equipment function, normal operating characteristics, and limiting conditions.
 - 2. Assembly, installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for start-up, routine and normal operation, regulation and control, shutdown, and emergency conditions.
 - 4. Guide to "troubleshooting."
 - 5. Parts lists, with vendor name and telephone number, and predicted life of parts subject to wear.
 - 6. Complete as-built drawings showing all details of construction.

PART 2 - PRODUCTS

2.1 GENERAL

All equipment and material shall be new. Equipment furnished and installed under this section shall be fabricated and assembled in full conformity with the drawings, specifications, engineering data, instructions, and applicable standards.

2.2 ACCEPTABLE MANUFACTURERS OF SWITCHGEAR COMPONENTS

Specified parts by brand and part number are for commonality for spares within other rural Alaskan communities with similar systems. Acceptable manufacturers of the switchgear equipment components shall be as follows:

- A. Engine Generator Controller (EGC): ComAp IS-NTC-BB. No Substitutes allowed. Provide all required accessories, mounting devices, power supplies,

cables, and all other equipment, software, or devices required by the manufacture or required to provide a fully functional system.

- B. Lock Out Switch. Key operated RUN/OFF switch mounted in panel face next to EGC, Cutler-Hammer 10250T1511-2, or approved equal. Switch shall be labeled "Generator Lockout for Service". When in the OFF position the switch shall disable the EGC and prevent engine starting.
- C. All components not otherwise indicated: Allen-Bradley, Cutler Hammer, General Electric, IDEC, Siemens, or Square D.

2.3 SWITCHGEAR ENCLOSURE

The following paragraphs describe general fabrication requirements for the switchgear enclosure.

- A. Provide one cabinet for the switchgear. The cabinet shall be a floor mounted, single-door, single access, NEMA 12 enclosure with continuous door hinge, key-locking 3-point door latch, and door gaskets. Overall cabinet dimensions shall be 90" high by 36" wide, by 20" deep. Hoffman, B-Line, or approved equal.
- B. The cabinet shall be front access only and the hinged front-opening door shall provide required access to all components for service and replacement. Elevate the door such that the door does not drag against the floor.
- C. Furnish with back panels, side panels, and rack mounting angles as required for equipment support.
- D. Provide a horizontal barrier panel between the 480 volt section in the bottom and the low voltage control equipment in the top of the cabinet. No 480 volt wiring will be allowed to enter into the low voltage control compartment. All 480 volt wiring shall enter in the lower compartment.
- E. Cables shall enter from the top or sides of the enclosure. Cable terminations shall be located to accommodate cable entry.
- F. The top of the EGC shall not exceed 60" above the bottom of the switchgear.
- G. Control wire shall have termination identification of each wire for ease of tracing. Terminal blocks shall be provided for control wires that run between field devices and the switchgear. Nameplates shall be provided to identify each device or function.

2.4 PAINTING

- A. Steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces that will be inaccessible after assembly shall be protected for the life of the equipment. Surfaces shall be cleaned and prepared in the shop. All mill scale, oxides, and other coatings shall be removed.
- B. All metal enclosure parts shall be phosphatized to ensure that the metal is properly degreased and cleaned.
- C. Exposed surfaces shall be finished smooth, thoroughly cleaned and filled as necessary to provide a smooth uniform base for painting and painted with one or more coats of primer and two or more finish coats of alkyd resin machinery enamel or lacquer as required to produce a smooth hard durable finish. The color

of the finish coats shall be ANSI 61 light gray.

- D. Provide a premium painting system throughout the painting process from initial cleaning to final assembly to assure a superior paint finish. All coatings shall be applied using an electro static paint system.
- E. Interior shall be ANSI 61 light gray, except that back pans shall be white.
- F. All parts of the switchgear enclosure shall be painted. No exterior or interior surfaces may be left unpainted, no exceptions.

2.5 CONTROL WIRING

- A. All control wiring shall be minimum 600 volt, copper 16-gauge, strand type SIS wire or equivalent. The contractor shall be responsible for sizing the appropriate wire for each component and circuit. Current transformer wiring shall be 12 gauge wire. All wires for control wiring shall have non-insulated spade type lugs, except where compression terminals are used. All current transformer leads shall be provided with non-insulated ring-type lugs. All lugs shall be tin-plated copper.
- B. Only one wire shall be inserted in a lug. Lugs shall be installed with a ratcheting type crimping tool. All wires shall be tagged with wire markers at both ends.
- C. All wiring shall terminate on terminal blocks or devices. No more than two wires shall be connected to a termination point. Terminal blocks for control wiring shall be 20 amp, 600 volt. All terminal blocks and exposed relays located in the controls compartment shall be provided with a plastic safety cover. Terminal blocks for DC circuits shall be separated from terminal blocks for 120 VAC.
- D. Current transformer leads shall be wired to shorting type terminal blocks. Shorting pins shall be provided with storage locations for the shorting pins.
- E. Terminal blocks shall be clearly labeled and shall match the designation shown on the contractor's drawings.
- F. Each end of each wire shall be identified per the marking and numbering shown on the wiring drawings with heat shrink labels. Each conductor shall have the terminal or device the conductor is terminated to at both ends positively identified at both ends of the conductor.
- G. Wiring shall be installed neatly in bundles and wireways. Adhesive backed tywrap bases shall not be used to support bundles. All wiring bases shall be securely attached with metal screws.

2.6 BUS BAR AND GROUNDING

- A. The power cabinet shall be provided with silver-plated copper main bus bars. The main bus shall be rated 400 amperes.
- B. Provide a section of bus for connection to the incoming generator feeder. Do not connect directly to the generator circuit breaker.
- C. Isolated copper neutral bus and ground bus shall be provided and shall have the same ratings as the main bus.

- D. The main bus shall be well braced to meet the short circuit ratings of the generators. Minimum bus bracing shall be 30,000 amperes symmetrical. The main bus shall be installed on insulators to provide proper clearances between phases and phase to ground.
- E. Generator circuit breaker/contactors shall be connected to the main bus by cables.
- F. The station service breaker shall be connected to the main bus by cables.
- G. A-B-C type bus arrangement (left-to-right, top-to-bottom, front-to-back) shall be used throughout to assure convenient and safe testing and maintenance.
- H. Termination lugs shall be provided on the line side bus for connection of the generator conductors to the generator contactor. Provide either a bus or cable connection to the generator contactor. Lugs shall be suitable for termination of the conductors indicated on the drawings, minimum 2 for each phase. The spacing of the lugs shall be NEMA 2-hole, 1.75" on center.

2.7 SWITCHGEAR DEVICES.

- A. Nameplates. All nameplates shall be black with white core type. Nameplates shall have beveled edges and shall be secured with a minimum of two mounting screws. Nameplates shall be provided for each device on the front of the switchgear and inside the switchgear. Inside the switchgear compartments, all relays, control switches, lights, etc. to which control or instrument transformer wiring connects, shall be marked by nameplates, with designations corresponding to the same device designations used on the wiring drawings and approved by the Engineer. Nameplates inside the switchgear located on swingout doors may be attached using adhesive epoxy.
- B. Overall nameplate. Provide an overall nameplate that provides the following information:
 - 1. Contractor's name and address.
 - 2. Contractor's type designation (optional).
 - 3. Contractor's shop order number.
 - 4. Third party listing identification.
 - 5. Rated maximum voltage.
- C. Third Party Listing Tag. Provide a tag identifying the third party listing of the equipment. If the enclosure was fabricated by a subcontractor, the enclosure shall be provided with the third party listing tag. The overall assembly shall also be provided with a third party listing identification tag that meets the requirements of the State of Alaska.
- D. Selector Switches. Selector switches shall be heavy-duty type. Contacts shall have silver butting or sliding contacts, rated 10 amperes continuous at 120 volts AC. Contact configuration shall be as required for the application. Legends shall be engraved on the switch nameplate.

Unless otherwise specified, all selector switches located on the front of the enclosure shall be Electros witch Series 24, or approved equal.
- E. Annunciator Lights. Annunciator lights shall be panel mount LED cluster type lamps. IDEC Corp. Series SLC40, or approved equal.

- F. Indicating Lights. Indicating lights shall be push to test, LED. Allen-Bradley, Type 800T or approved equal. Provide legend plate for each indicating light.
- G. Control Relays/Time Delays. Relays and timers for control operations or isolation shall be of the plug-in socket base type with dustproof plastic enclosures unless noted otherwise. Relays and timers shall be UL recognized, have 120-volt AC or 24-volt DC coils, depending on the application. Relays shall not have less than double-pole, double-throw contacts. Control circuit relays shall have silver-cadmium oxide contacts rated for 10 amperes at 120 volts AC. Electronic switching duty relays shall have gold-plated or gold alloy contacts suitable for use with low-level signals. Relays utilized for alarm input or indicating light service shall have contacts rated not less than 3 amperes. All relays and timers shall be provided with indicating lights. IDEC Corp, or approved equal.
- H. Relays for use on 24-volt DC circuits shall be provided with different bases than those for use on 120-volt AC circuits to prevent inadvertent swapping of relays.
- I. Auxiliary power relays shall be Allen-Bradley series 700, min 20A rated, or approved equal.
- J. Circuit Breakers.
1. Protective devices shall be resettable circuit breaker type for all AC and DC circuits in the switchgear. Replaceable fuse type devices are not acceptable.
 2. Circuit breakers shall be molded case circuit breakers of the amperage, voltage, short circuit capacity, and number of poles required for the application or as indicated on the one-line diagram.
 3. The generator and station service transformer shall be protected by a manually operated molded case circuit breaker, sized as indicated on the one-line diagram. Auxiliary contacts shall be provided to indicate breaker position. The closed position contact shall be wired to the EGC and to the annunciator to provide alarm indication any time the breaker is not closed (either tripped or manually opened). The station service circuit breaker shall be mounted in the face of the switchgear and shall be provided with a protective guard.
- K. Current Transformers. Instrument current transformers shall be specifically designed for installation in switchgear. The design shall coordinate the thermal, mechanical, and insulation limits of the current transformers with those of the breakers and bus of the switchgear in which they are to be installed. Current transformers shall be of the wound or window type, with silver-plated primary terminals. Insulation shall be suitable for 600 volt.
1. Current transformers for relay service shall be provided with a minimum C20 accuracy class with a rating factor of 2.0.
 2. Current transformers for totalizing and feeder meters shall be metering class with a minimum 0.3% accuracy and with a rating factor of 2.0.
 3. Current transformers for the station service meter shall be metering class with a minimum 0.3% accuracy.

4. Current transformers identified as multi-ratio shall be provided in the ratios indicated and shall be provided with the accuracy specified at full distributed windings.
- L. Potential Transformers. Instrument rated potential transformer shall be provided in the quantity and ratio as indicated on the drawings.
1. All potential transformers shall have primary and secondary protection using circuit breakers as specified herein.
 2. All potential transformer grounds shall be made directly to switchgear ground bus.

2.8 POWER DEVICES

- A. Provide all power devices as indicated on the one-line diagram and required for the proper operation of the switchgear and generator. At a minimum, provide the following devices:
1. Incoming circuit breaker. Provide auxiliary contacts to indicate circuit breaker position. The closed position contact shall be wired to the EGC to provide alarm indication any time the breaker is not closed (either tripped or manually opened). Indicate breaker position on the front of the switchgear as specified elsewhere. The circuit breaker shall be rated as indicated on the drawings.
 2. Generator Contactor. The generator shall have an electrically operated contactor to perform the normal on line/off line paralleling functions of the generator load controlled by the EGC. The contactor shall have auxiliary contacts as required for control and indication as specified herein. The contactor shall have an ampere rating as indicated on the drawings and shall be NEMA or IEC rated.

2.9 METERING EQUIPMENT

- A. Metering equipment shall be installed separately from the switchgear.
- B. Provide all cables, connectors, and other devices including CT shorting terminal blocks as required for a complete and operational metering system.

2.10 CONTROL POWER

- A. Control power for the switchgear shall be 24 VDC. All meters and other components requiring auxiliary power to operate shall operate from this control power source, unless otherwise specified. The engine start and run signals and all control circuits shall be 24 VDC unless otherwise specified.
- B. 24 VDC Power: The primary source shall be from a 120 VAC power converter provided as part of this switchgear and described below. The 120 VAC source shall be from the control power circuit described below. The secondary source shall be from the engine batteries as described below. The two power supplies shall be coordinated to automatically switch from the 120VAC source to the 24VDC source upon loss of AC power and automatically switch back when the AC power is restored. The system shall provide continuous power without interruption. The 24 VDC control power system shall include the following features:

1. The primary control power shall be from the 120 VAC power converter, 120 VAC primary input, 20 amp 24VDC output, minimum 480 W capacity. Allen-Bradley 1606-XLS480E or approved equal.
 2. The secondary power source shall be the engine batteries. The 24V engine battery power shall be connected to the 24V power converter through a power bridge rectifier, minimum 30A, rated, Semikron or approved equal.
- C. Provide terminals for connection of 24 VDC power to operate the combustion air intake dampers through an engine run relay.
- D. 120 VAC Power: The 120 VAC source shall be from a 20A station service circuit external to the switchgear. Provide terminal blocks for connection of the external 120 VAC power. The power converter, strip heater, and capacitive trip device shall be powered from this source.
- E. Control power for operation of the vacuum switch shall be 120 VAC derived from the 120 VAC control power circuit. Control power for tripping the vacuum switch shall be provided from a capacitive trip device, Instrument Transformers Inc. CTD-4-120, or approved equal. The capacitive trip device shall maintain adequate voltage to open the vacuum switch if station service power is lost. Charging power for the capacitive trip device shall be 120 VAC derived from the control power circuit. The vacuum switch control shall be configured such that it cannot be closed unless the standby power is synchronized with the tie line power. Once the vacuum switch has been opened, it shall be configured such that it cannot be closed for 10 seconds to allow time to recharge the capacitive trip device
- F. Provide a 24 VDC to 120 VAC inverter for the wireless Ethernet bridge PoE adapter. Inverter shall be suitable for the voltage and maximum power consumption of the wireless Ethernet bridge. Connect the inverter to a NEMA 5-15R receptacle with red cover.
- G. Each major device or meter shall be individually protected by circuit breakers. Fuses will not be acceptable. Clearly mark each circuit breaker for the intended service.

2.11 MONITORING AND CONTROL SPECIFICATIONS

- A. The generator switchgear shall provide controls to automatically and manually start and stop the engine, to parallel the engine-generator to the primary power source (12.47kV Togiak transmission line), to open and close the 12.47kV vacuum switch on the Togiak transmission line, and to trip the shunt trip circuit breaker on the generator in the event of a fault. The switchgear shall also operate field installed motorized dampers as indicated.
- B. The EGC shall control all functions and features of the engine-generator, both manual and automatic. The EGC shall start, stop, synchronize, and provide load sharing of the generator. The EGC shall be configured to control the voltage regulator through the voltage regulator auxiliary voltage bias input.
- C. The Contractor shall review all drawings and information provided and shall incorporate all engine safety functions into the EGC.

2.12 ENGINE FUNCTION MONITORING

- A. Through the EGC, provide remote monitoring and control based on the following sensors and switches for each engine:
1. J1939 CAN bus from engine ECU. Use for monitoring of engine speed, jacket water temperature, lubricating oil pressure, intake air temperature, and fuel flow rate.
 2. Oil Level Switch. A normally open switch will close when the oil level rises above or drops below pre-determined levels.
 3. Coolant Level Switch. A normally open switch will close when the coolant level drops below a pre-determined level.
 4. Log and maintain run time on the engine. Time shall be expressed in hours and minutes.

2.13 CONTROL COMPONENTS

The following components shall be supplied to allow control of field devices, monitoring, annunciation, metering and other operations as indicated. When a part number is specified no substitutes will be allowed unless noted "or approved equal". Note that some components have been specified under prior sections.

- A. Three (3) volt meters for display of Togiak power, digital display, 120VAC nominal, connected to 12.47 kV distribution line source PT's. Label "Togiak Power Phase A, B, C."
- B. Master Control Switch, Electros witch or approved equal. Configure for three position operation, MANUAL LOCAL – AUTO - EXERCISE.
- C. Emergency Stop Button, maintained contact mushroom pushbutton with guard, normally closed contact.
- D. Auxiliary power relays for operation of vacuum switch and contactor.
- E. Terminal Blocks, Relays, Timers, Bases.
- F. Control Power Supply, 20A, 120VAC/24VDC, 24VDC UPS, 12AH battery.
- G. One (1) Strip Heater. 50 Watt minimum, 120 volts AC, with thermostat.
- H. Annunciation LED's, mount near top of cabinet, left to right:

Top Row

1. Togiak Power On (green).
2. Togiak Power Off (red).
3. Engine Run (green).
4. Engine Normal Stop (amber).
5. Engine Alarm/Lockout (red).
6. Generator Circuit Breaker Trip (red).
7. Emergency Stop (red).
8. Spare (red).

B. Second Row

1. Generator Contactor Open (green)
2. Generator Contactor Closed (red)
3. Engine Battery Alarm (red).
4. Control Power Alarm (red).

5. Spare (red).
 6. Spare (red).
 7. Spare (red).
 8. Spare (red).
- I. Spare Input/Output
 1. Input: Provide a minimum of 2 spare EGC discreet input pairs wired to terminal blocks.
 2. Output: Provide a minimum of 2 spare two-pole relays wired to terminal blocks and controlled by the EGC.

2.14 GENERATION SEQUENCE OF OPERATION.

- A. A complete and successfully operating system shall be provided for starting, stopping, and paralleling, both automatically and manually, the generator unit. The EGC shall perform manual and automatic start and stop of the unit, synchronization, governor control, generator protection, load share, and voltage compensation. The following paragraphs describe the basic functional requirements of the system. The Contractor shall be responsible for the detailed design to provide a safe and satisfactorily functioning system.
- B. Engine Run. Any time the engine is running (in all three operating modes) power shall be provided to open ventilation dampers. The source power shall be the switchgear 24 VDC.
- C. Automatic Mode Operation.

With the Master Control selector switch in the "Auto" position and the EGC in the "Auto" position, the following sequences of operation shall be performed:

1. When the power from Togiak is on (normal mode) the generator shall be off, the generator contactor shall be open, and the vacuum switch shall be closed.
2. When the power from Togiak goes off, the following sequences of operation shall be performed:
 - a. The vacuum switch shall open.
 - b. The engine shall start and come up to rated speed and the combustion air dampers shall open.
 - c. After a time delay of three minutes for engine warm up, the generator contactor shall close to energize the community distribution.
 - d. The generator shall operate in isochronous mode as long as Togiak power remains off.
3. When the power from Togiak comes back on and remains on continuously for 10 minutes, adjustable, the following sequences of operation shall be performed:
 - a. The generator shall synchronize to Togiak power.
 - b. The vacuum switch shall close.

- c. The generator shall shed load.
 - d. The generator contactor shall open.
 - e. After a time delay of three minutes for engine cooldown, the engine shall stop and the combustion air dampers shall close.
- D. Exercise Mode Operation.
- 1. When the Master Control selector switch is moved from the "Auto" position to the "Exercise" position, the following sequences of operation shall be performed:
 - a. The engine shall start and come up to rated speed and the combustion air dampers shall open.
 - b. After a time delay of three minutes for engine warm up, the generator shall synchronize to Togiak power and the generator contactor shall close.
 - c. The generator shall operate with a base load of 50 kW, adjustable, as long as the Master Control selector switch remains in the "Exercise" position.
 - 2. When the Master Control selector switch is moved from the "Exercise" position back to the "Auto" position, the following sequences of operation shall be performed:
 - a. The generator shall shed load.
 - b. The generator contactor shall open.
 - c. After a time delay of three minutes for engine cooldown, the engine shall stop and the combustion air dampers shall close.
- E. Manual Local Mode Operation.
- 1. When the Master Control selector switch is moved from the "Auto" position to the "Manual Local" position and Togiak power is **ON**, the following sequences of operation shall be performed after a 10 second time delay, adjustable:
 - a. The engine shall start and come up to rated speed and the combustion air dampers shall open.
 - b. After a time delay of three minutes for engine warm up, the generator shall synchronize to Togiak power and the generator contactor shall close.
 - c. The vacuum switch shall open.
 - d. The generator shall operate in isochronous mode as long as the Master Control selector switch remains in the "Manual" position.
 - 2. When the Master Control selector switch is moved from the "Auto" position to the "Manual Local" position and Togiak power is **OFF**, the

following sequences of operation shall be performed after a 10 second time delay, adjustable:

- a. The vacuum switch shall open.
 - b. The engine shall start and come up to rated speed and the combustion air dampers shall open.
 - c. After a time delay of three minutes for engine warm up, the generator contactor shall close to energize the community distribution.
 - d. The generator shall operate in isochronous mode as long as the Master Control selector switch remains in the "Manual Local" position.
3. When the Master Control selector switch is moved from the "Manual Local" position back to the "Auto" position and Togiak power is **ON**, the following sequences of operation shall be performed:
- a. The generator shall synchronize to Togiak power and the vacuum switch shall close.
 - b. The generator shall shed load.
 - c. The generator contactor shall open.
 - d. After a time delay of three minutes for engine cooldown, the engine shall stop and the combustion air dampers shall close.
4. When the Master Control selector switch is moved from the "Manual Local" position back to the "Auto" position and Togiak power is **OFF**, the generator shall continue to operate in isochronous mode as long as Togiak power remains off. When Togiak power comes back **ON**, the switchgear shall perform the normal AUTO sequence as listed above.
- F. Engine and generation alarm conditions and sequences. Note that these apply to Manual, Auto, and Exercise modes.
- 1 Provide the following types of alarm sequences for each condition listed below:
 - a. Type A (Engine/Generation Alarm Soft Shutdown – F2):
Upon alarm condition immediately open the contactor, turn off the voltage regulator, run engine through a three minute cool down cycle, shut down engine, and illuminate "Alarm/Lockout" light and display an alarm banner on the EGC. Unit shall be locked out and alarm light shall remain illuminated until the problem is corrected and the EGC is manually reset. Note that if the contactor fails to open on an open command the generator circuit breaker shunt trip shall activate.
 - b. Type B (Engine Alarm Hard Shutdown – F3):
Upon alarm, immediately open contactor, turn off the voltage regulator, and shut down the engine without going through a cool

down cycle. Illuminate "Alarm/Lockout" light and display an alarm banner on the EGC. Unit shall be locked out and alarm light shall remain illuminated until the problem is corrected and the EGC is manually reset. Note that if the contactor fails to open on an open command the generator circuit breaker shunt trip shall activate.

- 2 For the following engine/generator alarm conditions perform the sequence indicated and illuminate the associated alarm light:
 - a. Low Oil Pressure - Provide a Type B shut down when the oil pressure drops to the alarm level of 10 psig, adjustable, and stays below that level for 5 seconds.
 - b. Oil Level - Provide a Type A shut down when the oil level switch closes for high or low level.
 - c. High Coolant Temperature - Provide a Type A shut down when the jacket water temperature reaches the pre-alarm level of 210°F, adjustable, and stays above that level for 30 seconds. Provide a Type B shutdown when the jacket water temperature reaches the alarm level of 215°F, adjustable.
 - d. Low coolant Level - Provide a Type A shut down when the coolant level switch closes.
 - e. Over Speed - Provide a Type B shutdown on overspeed.
 - f. Over Crank - If the engine fails to start after the over crank time delay has expired lock it out, illuminate the alarm/lockout lamp, and display an alarm banner on the EGC.
 - g. Running Timeout - If the engine runs without being placed on line for 10 minutes, adjustable, shut down the engine and lock it out.
 - h. Fail to Synchronize - Provide a Type A shutdown if a unit fails to synchronize after a preset time delay.
 - i. Over Current - Provide a Type A shutdown on operation of an overcurrent element.
 - j. Under Voltage - Provide a Type A shutdown on operation of an under voltage element.
 - k. Over Voltage - Provide a Type A shutdown on operation of an over voltage element.
 - l. Under Frequency - Provide a Type A shutdown on operation of an under frequency element.
 - m. Over Frequency - Provide a Type A shutdown on operation of an over frequency element.
 - n. Reverse Power - Provide a Type A shutdown on operation of a reverse power element.
 - o. Loss of Excitation - Provide a Type A shutdown on loss of excitation.
 - p. Emergency Stop - Provide a Type B shutdown upon opening of the Emergency Stop Pushbutton contact and illuminate the alarm lamp.

- 3 Circuit Breaker Trip – When the generator circuit breaker is open (tripped or manually opened) illuminate the alarm lamp.

2.15 GENERAL SYSTEM ALARMS

The switchgear shall provide alarm functions for the following systems:

- A. Engine Battery Alarm - When the normally open alarm circuit at the engine battery charger closes the engine battery alarm lamp shall illuminate. The alarm lamp shall remain illuminated until the fault clears.

2.16 ETHERNET SYSTEM

- A. Provide a SCADA system to provide communication back to the Togiak Power Plant SCADA system. The system shall consist of the following minimum equipment.
 1. Ethernet switch. Switch shall be Red Lion, Signet managed Ethernet switch. Provide 8 10/100Base-T(X) copper ports with PoE. Red Lion NT24k-8TX-POE or approved equal.
 2. Red Lion NTSA-CAT5e or approved equal Surge Arrester for each input into the Ethernet switch. Provide a minimum of four, one for the EGC, one for the station service meter, one for the wireless Ethernet extender, and one spare.
- B. Provide a CAT6e cable to connect to the EGC. Provide additional CAT6e cables as indicated on the drawings.
- C. Provide all cables and connectors as required to provide a fully functional system.

PART 3 - EXECUTION

3.1 FACTORY TESTS

- A. Prior to shipment, the Low-Voltage Switchgear Fabricator shall perform factory tests at the shop where the switchgear is assembled. Provide certified copies of all manufacturers' test data and results. Supply sufficient notice to the Authority prior to performing tests. The Authority reserves the right to witness all tests. Test procedures shall conform to ASME, IEEE, and ANSI standards, and NEMA standard practices section on testing, as appropriate and applicable.
- B. The Fabricator shall provide all required equipment and measuring and indicating devices required to perform the tests indicated. All devices shall be certified correct or correction data furnished for the device.
- C. Tests shall indicate satisfactory operation and attainment of guarantees and specified performance. Fabricator shall not ship equipment without approval by the Authority of the shop test reports.

- D. If the Owner elects to witness the testing, prior to actual witness testing by the Owner, the Contractor shall conduct sufficient tests and provide the test reports to the Owner to ensure that when the witness test is performed, the equipment will operate as specified. At a minimum, provide the following operational tests:
1. Verify that the system performs the sequence of operations as described above. Verify that the equipment performs each task as specified.
 2. Verify all protective relay functions.
 3. Verify that each annunciation point operates correctly. For external alarms, simulate the alarm.
 4. Disconnect 120-volt AC power to the control power supply in the master unit to verify that the system continues to operate without interruption from the 24 VDC source.
- E. Perform the following electrical test and inspections of the switchgear:
The switchgear equipment and circuit breakers shall receive factory production tests as listed below:
1. Equipment.
 - a. Low frequency dielectric test.
 - b. Grounding of instrument cases.
 - c. Control wiring and device functional test.
 - d. Polarity verification.
 - e. Sequence test.
 - f. Low frequency withstand voltage test on major insulation components.
 - g. Low frequency withstand test on secondary control wiring.
 2. Main Bus: Megger test at 1000 volts each bus to ground and phase-to-phase.
 3. Contactors:
 - a. Coil check test.
 - b. Clearance and mechanical adjustment.
 - c. 300 Electrical and mechanical operation test.
 - d. Conductivity of current path test.
- F. Tests that are provided by the manufacturer of the equipment need not be duplicated. However, documentation shall be provided that the test was performed.
- G. Perform multiple repetitions of individual operations as required by the Owner to adequately demonstrate satisfactory operation of all functions.

3.2 NOTIFICATION OF WITNESS TESTING

- A The Authority shall have the right to inspect, at the factory, all equipment covered by these specifications any time during manufacture and assembly and to be present during any tests made on the equipment.
- B The Authority may visit the manufacturing facility for final performance testing. The Contractor shall make a technician available to the Authority to assist in the

inspection and witness test of the switchgear. The technician shall instruct the Authority in all functions of the equipment.

- C The Contractor shall notify the Authority two weeks in advance of the scheduled test date. If the Contractor ships the equipment without allowing the Authority to witness testing of the equipment, or before the Authority accepts the equipment test, the Authority reserves the right to have a third party test the equipment in Anchorage, Alaska or at the F.O.B. destination. All costs associated with a third party test shall be deducted from the Contractor's final payment. If the switchgear fails any test, the Contractor shall be responsible for correction of all deficiencies, retesting, and proving the switchgear operates as specified and meets the requirements of these specifications with no increase in the contract price.

END OF SECTION

**SECTION 26 32 13
ENGINE GENERATORS**

PART 1 - GENERAL

1.1 SCOPE

- A. The Work included herein shall consist of providing, fabricating, and factory testing a complete engine generator package as specified herein.
- B. The unit shall be harmonically balanced and shall be delivered complete and ready for installation.
- C. Provide all accessories as specified for all engine generator units plus any additional components listed.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Materials and Methods
- C. Section 26 05 33 Raceway and Boxes for Electrical Systems

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 26 05 00 - Common Work Results for Electrical and Division 1.
- B. Provide complete and accurate drawings of the equipment, including outline drawings and dimensional data which fully describe the height, width, and depth of the equipment; skid construction; schematics; wiring diagrams; and other relevant details.
- C. Provide a part number and dimensional drawing for the exhaust flex in accordance with Paragraph 2.4.
- D. Provide mechanical and electrical performance data including intake and exhaust air flow; charge air cooling requirements (if applicable); heat rejection; engine coolant pump curve at rated speed; fuel flow rate; fuel consumption at 100%, 75%, 50%, and 25% of rated prime power; and other relevant data.
- E. Provide torsional compatibility analysis for each unique engine generator combination.
- F. Provide manufacturer's catalog literature for all accessories and equipment.

1.4 REGULATORY COMPLIANCE

The Environmental Protection Agency (EPA) has issued New Source Performance Standards (NSPS) regulations governing use of stationary diesel engines in remote areas of Alaska. The following provisions of 40 CFR Subpart IIII apply to this solicitation:

- A. 40 CFR 60.4202(g) permits manufacturers to produce new stationary, emergency engines certified to 40 CFR 1042 (Tier 3 Marine) if used solely in remote areas of Alaska.

- B. 40 CFR 60.4205(b) permits owners and operators to install new emergency engines that comply with 40 CFR 60.4202.

In order to comply with EPA emissions requirements and also be compatible with the intended service applications, the diesel engine furnished under this solicitation shall be a new Tier 3 Marine certified engine.

1.5 QUALITY ASSURANCE

- A. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practices. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall be new and shall not have been in service at any time prior to delivery, except as required by tests.
- B. Equipment and components furnished under these specifications shall be in accordance with the requirements of applicable UL, NEC, IEEE, NEMA, and ANSI standards.

1.6 FABRICATOR QUALIFICATIONS

The engine generators shall be supplied, coordinated, and assembled by a qualified fabricator (Fabricator) who is regularly engaged in the business of providing diesel engine driven generator equipment.

- A. The Fabricator shall have staff with extensive experience in packaging diesel engine driven electrical generators. A list of five successful installations that key staff have worked on may be requested by the Authority after the bid opening and prior to award in order to verify Fabricator qualifications. The list shall include installation date, description of installation, and a reference contact for each installation.
- B. The Fabricator shall maintain a competent service organization that is available for field service calls. A description of the organization including resumes of key personnel may be requested by the Authority after the bid opening and prior to award in order to verify Fabricator qualifications.
- C. The Fabricator shall have a fabrication facility with adequate space and appropriate equipment as required to perform the work. The Authority may inspect the Fabricator's shop after the bid opening and prior to award in order to verify Fabricator qualifications.

1.7 CONTRACTOR WARRANTIES

- A. The Contractor shall warrant the work for a period of not less than one-year after energization of the equipment. In the event of equipment or component failure during the warranty period, the Contractor shall replace such defective equipment or components and bear all associated costs. The Contractor shall pursue Fabricator's warranties to the extent necessary to obtain replacement equipment and provide proof of action taken upon request. Assist Authority as directed in determining cause of failure.
- B. The warranty shall state in clear terms exactly what warranty coverage the seller provides, for each unit and attachments. This shall include the terms, length of coverage, reporting responsibilities, how the warranty applies to accessory

equipment, restrictions, locations of local facilities for handling warranty and other repairs (including contact names), and any other available information pertaining to warranty.

- C. Provide a nametag on each piece of equipment that clearly identifies the party responsible for the warranty. Nametag shall include the name, address, and phone number, and shop order or Contractor's serial number.

1.8 OPERATION AND MAINTENANCE MANUALS.

- A. Provide one (1) complete bound set of operation and maintenance (O&M) manuals for each unique engine generator set. Identification symbols for all replaceable parts and assemblies shall be included. Provide manuals for the following equipment:
 - 1. Engine.
 - 2. Generator.
 - 3. Voltage Regulator.
 - 4. All accessories.
- B. For each engine provide all available factory service publications including parts manuals, service manuals, component technical manuals, etc.
- C. For all other components of each engine generator unit provide:
 - 1. Equipment function, normal operating characteristics, and limiting conditions.
 - 2. Assembly, installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for start-up, routine and normal operation, regulation and control, shutdown, and emergency conditions.
 - 4. Lubrication and maintenance instructions.
 - 5. Guide to "troubleshooting."
 - 6. Parts list and predicted life of parts subject to wear.
 - 7. Outline, cross section, elevation, and assembly drawings
 - 8. Engineering data including all mechanical and electrical performance characteristics.
 - 9. Complete AC connection and three-line diagrams.
 - 10. Complete DC schematics including voltage regulator, fuel injector pump, sensors, switches, fuses, and all other devices.
- D. The operation and maintenance manuals shall be in addition to any instructions or parts list packed with or attached to the equipment when delivered, or any information submitted for review.
- E. Bind materials in locking three ring "D" style binders. Binder capacities shall not exceed 3 inches, nor shall material included exceed the designed binder capacity. If material to be bound exceeds capacity rating, multiple volumes shall be furnished. Binder capacity shall not be less than approximately 1/2 inch

- greater than the thickness of the material within the binder. Permanently label with project information on the front cover and edge.
- F. Where reduction is not practical, larger drawings shall be folded separately and placed in envelopes, which are bound into the manuals. Each envelope shall bear suitable identification on the outside.
 - G. All information in the O&M manuals shall be new and original publications.
 - H. The O&M manual shall be provided in a PDF format in addition to the binder and shall include all information including as-built drawings.

PART 2 - PRODUCTS

2.1 GENERAL CONFIGURATION AND MANUFACTURERS

- A. The engine generator shall be a complete skid mounted assembly utilizing all new components.
- B. The engine generator shall be configured as specified herein and shall include all accessories as indicated.
- C. The engine shall be rated for prime power duty at the horsepower (shaft) and electrical kilowatt (generator) ratings indicated. All engines shall be 1800 RPM unless specifically indicated otherwise. All starting and control systems shall be 24 VDC as indicated in the Specific Configuration requirements that follow.
- D. Provide engines of the manufacturer and model indicated in the Specific Configuration requirements that follow.
- E. Provide Newage/Stamford generators as indicated in the Specific Configuration requirements that follow or Kato equal, no other substitutes except as specifically noted below. The generator shall be rated for continuous output at the value and temperature rise indicated at 0.8 power factor. The generator shall be 2/3 pitch winding, 3 phase, 277/480 volt, 12 lead reconnectable, with PMG excitation.
- F. If a Marathon or other generator of equivalent or greater capacity is provided it shall be modified and upgraded prior to installation. Upon receipt of the generator from the factory it shall be taken to a manufacturer's authorized warranty service shop and the following tasks shall be performed:
 - 1. Remove rotor assembly, bearing, exciter, diode plate and inspect for defects.
 - 2. If any defects are encountered immediately file a warranty claim with the manufacturer.
 - 3. Electrically test all windings.
 - 4. Encapsulate exciter rotor winding with epoxy.
 - 5. Replace bearing prior to reinstalling exciter.
 - 6. Replace diode plate mounting bolts with grade 8 bolts and use Loctite.
 - 7. Insulate main rotor leads with phase paper. Secure leads with heat shrinkable polyester tape using epoxy on all knots.
 - 8. Spray coat all windings with epoxy.
 - 9. Dynamically balance and re-assemble.

10. Test at rated RPM.

2.2 SPECIFIC CONFIGURATION

Furnish Engine Generator set of the capacity and configuration listed below:

Engine - 223 hp, 150 kW prime, John Deere 6068AFM85, Tier 3 Marine.
Starting and Control Voltage = 24 VDC.

Generator - Minimum 185kW continuous at 105°C rise, Newage/Stamford UC1274H or Kato equal.

Voltage Regulator Cross Current Transformer Ratio = 250:5

2.3 ENGINE

- A. Provide a skid mounted, industrial rated, 1800 RPM, diesel engine complete with generator/alternator and ready for service. The unit shall be of newest design and of recent manufacture.
- B. The marine engine shall be furnished without a charging alternator, heat exchanger, coolant expansion tank, or accessory reduction gear drive. Factory installed components shall be removed as required.
- C. The engine shall be a four-cycle, water-cooled, direct injection diesel engine of 6 cylinder in-line configuration as indicated by model number.
- D. Cylinder Liners: The engine shall be provided with removable cylinder liners to facilitate field rebuilding.
- E. Horsepower: Certified engine power curves and fuel consumption at 25%, 50%, 75%, and 100% loading, shall be submitted showing the manufacturer's approval of the engine rating for generator set prime power application. Special ratings or "continuous standby" ratings will not be acceptable.
- F. Engine Control: All engine control functions will be performed by remote switchgear which will perform all start/stop, speed, paralleling, and load sharing control functions in addition to all engine function monitoring and safety shut downs. Engine manufacturer's electronic control panels shall not be provided as part of this package.
- G. ECU and Isochronous Governor: The engine speed shall be 1800 RPM over the entire load range. The frequency at any constant load, including no load, shall remain within +/- 0.5% isochronous control for rated frequency operation. Provide an Engine Control Unit (ECU) for interface with the switchgear.
- H. Fuel: The engine shall be capable of satisfactory performance on No. 1 Arctic Grade Fuel or No. 2 Domestic Burner Oil.
- I. Fuel System: The engine shall have manufacturer's engine mounted fuel filters with replaceable elements. Fuel supply and return lines shall be routed to the front of generator skid for field connection to the plant piping. See design drawings for detailed configuration.
- J. Lubrication: The engine shall have a gear type lubricating oil pump for supplying oil under pressure to the main bearings, crankshaft bearings, pistons, piston pins, timing gears, camshaft bearings and valve rocker mechanism. Threaded spin-on type, full flow lubricating oil filters shall be provided. The oil

drain line shall be terminated with a ball valve and bulkhead fitting through the skid on the side of the unit as indicated in the design drawings.

- K. Oil Level: The engine shall have a combination visual oil level site gauge with adjustable high and low level switches, Murphy L129CK1 or approved equal. Mount on rubber isolators and connect to engine with minimum #8 hoses. Carefully route upper vent hose to avoid any low point traps and connect directly into crankcase. Route lower hose to a connection directly on the oil pan. Do not tee lower hose into oil drain line. See design drawings for installation detail.
- L. Fuel and Oil Hoses: All hoses for fuel, lube oil, vents, mechanical gauges, etc., shall be Aeroquip type FC300, Eaton Weatherhead H569, or approved equal. Minimum hose size shall be 5/16" (#6). Provide with re-useable JIC swivel type fittings. Push-on or barb type hose connections will not be allowed. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.
- M. Glycol Hoses: All hoses for glycol shall be Teflon hose with stainless steel outer braid, Eaton Weatherhead H243, or approved equal. Provide with re-useable plated steel straight JIC swivel ends with NPT adapters. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.
- N. Wire Loom: All wiring for control and instrumentation shall be routed in plastic loom. Provide tee fittings for all branch connections. Route loom to avoid wear points and to ensure access to normal service points on the engine. Securely support loom from engine and skid.
- O. Protective Guards: All moving parts and hot surfaces shall be provided with protective guards in accordance with U.L Standard 2200.
- P. Air Cleaners: The engine shall be provided with a dry-type, replaceable element air cleaner with a metal canister, Donaldson or approved equal. Open disposable type air filters or plastic canisters will not be accepted. Provide visual air restriction indicator, 20" water column limit, manual reset, Donaldson X002251 or approved equal.
- Q. Starting: The engine shall be equipped with a 24 VDC electric starting system. The starting system shall be of sufficient capacity to crank the engine at a speed which will allow full diesel starting. A starter auxiliary relay shall be remote mounted in the control wiring junction box, Caterpillar 9X-8124 or approved equal.
- R. Control Power: To provide 24VDC power to the control wiring junction box, a 30A circuit breaker with switch shall be mounted on the engine in the vicinity of the starter, Cooper 187-030-F-00 or approved equal.
- S. Sensors and Safety Controls: The engine shall be equipped with the following:
 - 1. Exhaust Gas Temperature. High temperature (650°C) 2 wire 100 ohm RTD with 2' high temperature lead wire, Deutz DT06-2S-E008 male connector, Deutz DT04-2P-E008 female connector, and compression fitting with 1/4" MPT adapter. Eustis RGB7B203B02WT with NS44 adapter or approved equal. See note 2 below.

2. Air Filter Vacuum Sensor. 4-20mA, -30”Hg to 0 PSIG, 1/4” MPT. Noshok 100-30V-1-1-2-7 or approved equal.

Note 1. The above listed sensors shall be independent from engine gauges and all other devices and sensors. Where standard factory furnished sensors for the above listed functions are required for operation of the ECU, provide additional duplicate sensors as specified. All sensors shall be installed on the engine and wired to terminal blocks as indicated in the design drawings.

Note 2. Upon completion of shop testing, if exhaust gas temperature sensor is installed in flex remove sensor and tywrap to engine in a secure location for shipping.

- T. Safety Controls: The remote switchgear will be equipped with automatic safety controls which will shut down the engine in the event of high jacket water temperature (primary), high lubricating oil temperature, low lubricating oil pressure, high or low lubricating oil level, high air filter restriction, and engine overspeed based on J1939 Canbus and engine mounted sensors. Note that a single low water shut down switch will be installed on the external cooling system.

2.4 EXHAUST SILENCER

- A. A critical grade silencer shall be furnished with each engine. Packed disc style, bottom center in and side out, ASA 125# flanges, internal acoustical/thermal wrap, critical grade, four mounting tabs, high temperature satin black finish. E.M. Products DCK2 or approved equal. The silencer shall be 4” size and installed as indicated on the design drawings.
- B. A flexible, continuous, 18 inch long stainless steel exhaust flex connector with welded connections shall be furnished for each engine, Alaska Rubber or approved equal. Provide an appropriate engine mating connection at one end and an ASA 125 lb. flange sized to match silencer at the opposite end. Slotted cuff connections are not acceptable. Provide gasket, bolts, v-clamp, or any other components required for connection to the engine. Provide a 90° elbow where required for the flex to be installed vertically. Note that if the exhaust temperature sensor cannot be installed directly in the outlet connection, a 1/4” FPT stainless steel thread-o-let shall be welded into the flex between the engine connection and the corrugated hose. Note requirement under Submittals to assign a part number and provide a dimensional drawing for the exhaust flex.

2.5 ACCESSORIES

Provide the following accessories for each engine generator:

- A. Spring vibration isolators complete with mounting hardware, four (4) per each unit, sized for the complete engine generator package weight. Caldyn RJ or approved equal.
- B. Drip pan, 16 gauge galvanized sheet metal, liquid tight joints, 20” wide by 50” long by 1” high.
- C. Minimum 800 cold crank amp 12-volt starting batteries, two for each engine. Batteries shall be sealed maintenance free, Optima Red Top NAPA Part Number BAT N993478RED or approved equal. Each battery shall be installed in a

battery rack sized to securely hold the battery and shall include a minimum 5/8" plywood base.

- D. Arctic flex battery cables, #2/0 AWG, two each length as required to provide service loops plus one 12-inch long jumper. All cables shall include compression type terminal ends with heat shrink at the end of the cables. One battery cable shall be red for the positive lead and the other shall be black for the negative lead. The jumper shall be black with red heat shrink one end.

2.6 COOLING SYSTEM

- A. Engine cooling shall be by remote radiator with coolant circulation driven by the engine coolant pump.
- B. Provide glycol filter in accordance with the design drawings.
- C. Provide low coolant level switches in accordance with the design drawings.
- D. On marine engines upon removal of coolant expansion tank and other accessories that are not required, provide modifications as follows:
 - 1. Install 2" diameter steel tube coolant line extensions to the front of the engine as required for 2" coolant hose connection.
 - 2. Manifold vent lines into a single connection near the front with a 3/8" NPT quarter turn gauge cock isolation valve for connection to the vent hose.

2.7 INSTRUMENT PANEL

- A. Provide a J1939 multi-function monitoring panel, Murphy PowerView PV101-C or approved equal. The panel shall be mounted on the side of the control wiring junction box. Provide with wiring harness as required for connection to ECU and battery power.

2.8 GENERATOR/ALTERNATOR

- A. Generator shall be a single bearing, four pole, synchronous type. Generator shall be directly connected to the engine flywheel housing and driven through a flexible coupling to ensure permanent alignment. The generator shall be rated three phase, 277/480V, 60 Hz, 1800 RPM, brushless, 12 lead reconnectable, and winding pitch of 2/3 design. Windings shall be random wound and lashed at the end turns to provide superior mechanical strength.
- B. The rotating assembly shall be dynamically balanced to less than 2 mils peak to peak displacement and shall be designed to have an over speed withstand of 125% of rated speed for 3 minutes when operating at stable rated operating temperature.
- C. Cast iron end brackets with bearing bores machined for an O-Ring to retard bearing outer race rotation and fabricated steel frames shall be used. Bearings shall be pre-lubricated, double shielded, ball type, single row Conrad, C3 fit. Minimum B-10 bearing life shall be 30,000 hours for single bearing units.
- D. Generator wiring diagram shall be permanently installed on the inside of the terminal enclosure cover.
- E. The insulation system of both the rotor and stator shall be of NEMA Class H materials or better and shall be synthetic and non-hygroscopic. The stator

- winding shall be given multiple dips of resin, plus a final coating of epoxy for extra moisture and abrasion resistance. The rotor shall be layer wound with thermosetting 100% solids epoxy between each layer, plus a final coating of epoxy for moisture and abrasion resistance. The shaft exposed metal surfaces and rectifier assembly shall be coated with an epoxy varnish.
- F. The generator shall be equipped with a permanent magnet generator (PMG) excitation system. Both the PMG and the rotating brushless exciter shall be mounted outboard of the bearing. The system shall supply a minimum short circuit support current of 300% of the rating for 10 seconds. The rotating exciter shall use a three-phase full wave rectifier assembly with hermetically sealed silicon diodes protected against abnormal transient conditions by a multi-plate selenium surge protector. The diodes shall be designed for safety factors of 5 times voltage and 3 times current.
- G. Voltage Regulator: The voltage regulator shall control the output of the brushless AC generator by regulating the current into the exciter field. Regulator shall include electromagnetic interference (EMI) filtering, and under frequency roll-off protection. The voltage regulation shall be 0.25% from no load to full load and 4% frequency variation. Caterpillar CDVR, Basler BE2000E, or approved equal.
1. The voltage regulator shall be mounted inside of the control wiring junction box as indicated on the design drawings.
 2. The voltage regulator shall be furnished complete with a cross current transformer (CT) for paralleling operation. Install the CT on Phase B generator lead with H1 facing towards the generator. The CT ratio shall be as indicated in the prior Specific Configuration requirements.
 3. Provide a wiring harness and terminal strips for connecting the voltage regulator to the cross current transformer, 3 phase voltage sensing, field, and PMG blocks as indicated on the design drawings.
- H. Nameplate: On the side of the generator housing, provide a nameplate that provides the following information. The nameplate shall be located in a clearly visible location and shall not be obscured by the terminal enclosure or located such that the nameplate is behind any part of the generator or housing.
1. Rated kW as specified.
 2. Full load amps.
 3. Rated voltage, phase, and power factor.
 4. Rated voltage and current of the field exciter.
- I. Each generator shall be provided with a standard sized terminal compartment. The terminal compartment shall be provided with a load connection block to allow easy field termination of the load, neutral, and ground conductors. The generator neutral connection shall not be connected to the mounting skid or the generator frame. The neutral shall be isolated for field grounding at the switchgear or transformer.
- J. The generator shall be self-ventilated with a direct drive one-piece, cast aluminum alloy, unidirectional internal fan for high volume, low noise air delivery.

Airflow shall be from opposite drive end through generator to drive end. The exciter shall be in the airflow.

2.9 MOUNTING SKID

- A. The engine and generator shall be equipped with a suitable full length base frame (skid) for mounting the engine and generator. The skid shall be constructed from structural steel channel with ends beveled and plated for short term skidding and rolling of unit. **No formed or stamped steel base frame designs will be accepted.** Provisions shall be made so that the generator can slide back a minimum of 12" to access the rear main seal on the engine without removing the generator end off of the skid or requiring the use of blocking to support it. See the design drawings for skid design and layout.
- B. Provisions shall be made in the skid for the mounting of vibration isolators at locations as indicated on the design drawings. Wedge washers shall be welded in place on the skid to provide a flat surface for the vibration isolator lock nuts.
- C. Each engine generator shall be placed on the skid at the location indicated on the design drawings.

2.10 WIRING INTERFACE WITH REMOTE SWITCHGEAR

- A. A control wiring junction box shall be furnished for each generator as follows:
 - 1. The junction box shall be steel, NEMA 4, minimum 20"x20"x6", with hinged door and screw down latches, Hoffman A20H20ALP or approved equal.
 - 2. The junction box orientation, device layout, terminal block layout, and labeling shall be as indicated on the design drawings.
 - 3. Install the voltage regulator and the instrument panel as previously specified in the junction box as shown on the design drawings.
 - 4. All wiring for control, monitoring, and safety shall be terminated on terminal blocks within the control wiring junction. The terminals shall be IDEC or approved equal, BNH15LW except where indicated 50A provide BNH50W. Terminals shall be mounted on DIN rail with heavy duty end anchors. Each terminal block and all wire terminations shall be individually numbered as indicated on the design drawings.
 - 5. The engine and generator mounted control wiring shall be provided with a maintenance loop of sufficient length to allow the generator to be slid back 12" minimum for maintenance of the engine without disconnecting any control wiring.
- B. The DC power supply for the switchgear shall be provided from the engine starting batteries through the engine-mounted circuit breaker. Terminals shall be provided on the terminal block as indicated on the design drawings for supplying 24 VDC to the switchgear. The engine start and run systems shall be 24 VDC. All remote indication will be 24VDC, 4-20mA, or as otherwise indicated. All switches used for remote indication shall be rated for operation at 24 VDC.

2.11 PAINTING

Each unit shall be painted John Deere industrial tan including engine, skid, and generator.

PART 3 - EXECUTION

3.1 FACTORY TESTS

- A. Prior to shipment, the Fabricator shall perform factory tests on each unit at the shop where the engine generator is assembled. Provide certified copies of all test data and results. Supply sufficient notice to the Authority prior to performing tests. The Authority reserves the right to witness all tests. Test procedures shall conform to ASME, IEEE, and ANSI standards, and NEMA standard practices section on testing, as appropriate and applicable.
- B. The Fabricator shall provide all required mechanical and electrical equipment including but not limited to fuel supply, radiator, load bank, and voltage regulator.
- C. The Fabricator shall provide all required measuring and indicating devices. All devices shall be certified correct or correction data furnished for the device.
- D. Engine Tests: Shop test each engine generator with the associated control wiring junction box permanently connected. Perform customary commercial factory tests on each engine generator including, but not limited to, the following:
 - 1. Perform hydrostatic test on water jackets to assure that water seals and water jackets are watertight. Test report shall indicate pressure at which test was made and the results.
 - 2. Place engine in continuous operation without stoppage for a period of not less than eight hours. Operate not less than one hour at each load point (1/2, 3/4, and full load) and 1 hour at 110 percent of rated load. If stoppage becomes necessary during this period, repeat the 8-hour run. Also record the following data at the start, at 15-minute intervals, and at the end of each load run: Hz, kW load, fuel consumption, exhaust temperature, intake air temperature, jacket water temperature, lube oil temperature, lube oil pressure, manifold (boost) pressure, and crankcase vacuum.
- E. Tests shall indicate satisfactory operation and attainment of guarantees and specified performance. The Fabricator shall not ship equipment without approval by the Authority of the shop test reports.

3.2 SHIPPING

- A. After completion of factory tests, and immediately prior to shutdown for shipping perform the following steps:
 - 1. Operate the engine three to five minutes with oil, which has 3% to 4% VCI (volatile corrosion inhibitor) oil per engine crankcase volume. The oil does not have to be removed from the engine.
 - 2. Remove any dirt from the air cleaner; check all seals and gaskets. Put lubricant on all points given in the lubrication chart of the engine operation guide.

3. Turn the engine at cranking speed with governor control in full off position and use a sprayer to add a mixture of 50% VCI oil and 50% 30 weight oil into the air intake or turbocharger inlet.
 4. Continue spraying the mixture of 50% VCI oil and 50% 30-weight engine oil into the air intake or turbocharger inlet to ensure the cylinders and exhaust ports are coated with the oily mixture.
 5. Clean the outside of the engine and inspect and ensure that the engine and generator are covered by good quality paint. Correct any deficiencies.
 6. Spray a thin amount of 50% VCI oil and 50% 30-weight engine oil on the flywheel, ring gear teeth, and starter pinion. Install the covers to keep the vapors in.
 7. Flush the cooling system with extended life 50/50 ethylene glycol mix, Shell Rotella ELC or approved equal. Install covers over the connections.
 8. Install a positive mechanical seal consisting of a fitting plate and gasket on exhaust opening. Then install all covers and/or tape on openings, air intake, exhaust openings, flywheel housing, etc. Ensure all covers are air tight and weatherproof. Use waterproof, weather resistant type tape. Do not install tape in such a manner as will damage paint when the tape is removed. Install a mechanical protective device over any protruding items, which may be vulnerable to breakage during transportation.
- B. After preparing the equipment for shipping, package each engine generator separately as follows:
1. Coil wiring harnesses and secure control wiring junction box to generator.
 2. Put a waterproof cover over the entire engine generator set. Make the cover tight, but loose enough to let air circulate around the unit to prevent damage to exposed metal parts from condensation.

END OF SECTION

SECTION 26 55 33
HAZARD WARNING LIGHTING SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This section describes specific requirements, products, and methods of execution relating to design and installation of a medium dual catenary lighting system to be installed as indicated on the Drawings and specified herein.
- B. The medium dual catenary lighting system shall be installed at the distribution system crossing of the Togiak River as indicated on the drawings and specified herein.
- C. The medium dual catenary lighting system shall be an FAA approved L-866/L-885 (white/red) catenary strobe system, as indicated on the drawings and specified herein and shall be synchronized such that the lights flash in the sequence required by FAA Advisory circular AC 70/7460-1L CHG 1, chapter 10.
- D. The contractor shall provide all design required to meet the specifications. The structures indicated on the drawings, two outside structures on each side of the Togiak River Crossing (four total), shall be marked and lighted in accordance with FAA Advisory circular AC 70/7460-1L CHG 1, chapters 4, 10, and 12.
- E. The two outside aerial conductors shall be provided with aerial marker balls as indicated on the drawings and specified herein.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical.
- B. Section 26 05 02 Basic Materials and Methods.
- C. Section 26 05 26 Grounding and Bonding for Electrical Systems.

1.03 QUALITY ASSURANCE

- A. FAA Advisory circular AC 70/7460-1L CHG 1.
- B. FAA Advisory circular AC 150/5345-43, latest edition.
- C. The medium dual catenary lighting system shall be listed by a third party listing agency recognized by the State of Alaska.

1.04 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.

1.05 WARRANTY

Provide a five year warranty.

PART 2 – PRODUCTS

2.01 CATENARY LIGHTING SYSTEM

- A. Provide a catenary lighting system for each pole indicated on the drawings. Each catenary lighting system shall be provided with a control panel on each side of the crossing and the system shall be a coordinated system that shall control the lights. All components shall be installed inside the control panel except the catenary strobes and antenna, and possibly the surge suppressor. The control panel shall meet the following requirements.
1. Control Panel: Provide a control panel for each pole that meets the following requirements.
 - a. NEMA 4X, stainless steel or copper free marine grade aluminum.
 - b. Power supply: 120 volts or 240 volts, single-phase, AC.
 - c. Temperature rating of -40°F to +131°F.
 - d. Surge Suppressor: 50kA/Phase, 25kA/Mode. NEMA 4X enclosure. Temperature rating of -40°F to +140°F. MCOV 150V/300V.
 2. The control panel shall be provided with all power supplies, surge protectors, connectors, and all other equipment recommended by the manufacture or required for the proper operation in accordance with the referenced FAA circulars.
- B. Catenary Strobe: L-866/L-885 LED (white/red). The strobe shall meet the following requirements.
1. Maintenance free.
 2. LED technology of light output for both the red beacon and white strobe.
 3. Universal 120/240 VAC, 50/60 Hz power factor corrected supply.
 4. Candela:
 - a. White Day: 20,000 cd.
 - b. White Night: 2,000 cd.
 - c. Red Night: 2,000 cd.
 5. Wattage:
 - a. White Day: 120W.
 - b. White Night: 20W.
 - c. Red Night: 45W.
 6. Ambient Temperature: -40°F to +131°F.
 7. Maximum Flash Rate: 60 FPM.
 8. Multiple unit synchronization from single controller. Shall be capable of operating with different manufacturers of GPS sync devices.
 9. Dialight Vigilant L-866/L-885 Catenary Strobe, or approved equal.

- C. Photocell: Provide a photocell as required by the manufacture to operate the catenary lighting system as required by the FAA circulars. The photocell enclosure shall be provided with two threaded hubs.
- D. GPS Antenna: Provide a GPS bullet antenna to synchronize the Satellite GPS pulse and synchronize each structure to flash simultaneously. The GPS antenna shall be installed on the photocell enclosure.

2.02 AERIAL MARKER BALLS

- A. Aerial marker balls shall be 36 inch in diameter and shall be constructed of K-10 ABS. Marker balls shall be provided with a UV weather cap to ensure superior color retention and prevent fading, cracking, or breaking.
- B. Aerial marker balls shall be securely attached to the conductor with spiral formed armor rods. The spiral preform armor rod shall extend outward from the marker and reinforce and protect the conductor at the point of attachment. Marker balls shall be completely slip-proof. The preformed armor rod shall match the specific size, type, and diameter of line.
- C. Aerial marker balls shall be provided with reflective tape to provide visibility at night. The reflective tape shall be visible up to 2500 feet away at night.
- D. Aerial marker balls shall be solid colors, international orange, yellow, or white.
- E. SpanGuard ABS markers as provided by P&R Tech, or equal.

2.03 SUPPORTS

- A. All supports shall be hot dip galvanized, stainless steel, or marine grade aluminum.
- B. Bolts, nuts, screws, washers, or similar ancillary materials used shall be 304 or 316 stainless steel.

2.04 CONDUCTORS

- A. All open conductors shall be multi-conductor cables as recommended by the manufacture.

PART 3 – EXECUTION

3.01 CATENARY LIGHTING SYSTEM

- A. Install catenary lighting systems in accordance with the manufacturer's instructions and all appropriate FAA circulars. Provide all cables, conductors, and equipment as required by the FAA or the manufacture to provide a complete and operational system as specified herein.
- B. All conduit connections to the control panel enclosure shall enter from the bottom, back, or from the side. Do not install any conduit penetrations in the top

of the enclosure. All conduit connections shall be installed using a weatherproof hub.

- C. All cable and conductors shall be installed in conduit except at the final terminations to equipment where there is no conduit connection. At equipment with no conduit connection, install a weatherhead near the equipment and keep open conductors to a minimum.
- D. All conduits that terminate in a weatherhead shall be provided with a means to prevent water from entering the enclosure. Install a LB conduit, or similar fitting, near the enclosure conduit termination. Install a low point in the conduit and install a conduit drain/breather, Crouse Hinds type ECD or similar, at the low point.
- E. Provide support for the control panel on the steel pipe support structure for the river crossing poles. Weld attachments to the structure and install the control panel no higher than five feet to the top of the enclosure. Paint the supports as specified on the drawings. See structural drawings.
- F. Install the catenary strobes as indicated on the drawings and required by the FAA circulars.
- G. Install a NEMA 4X stainless steel disconnect switch at each control panel to provide a means of local isolation.
- H. Install grounding as recommended or required by the manufacture.

3.02 AERIAL MARKER BALLS

- A. Install alternating colors, as recommended by FAA Advisory circular AC 70/7460-1L CHG 1, on the overhead lines to optimize visibility in all seasons.
- B. Install aerial marker balls in accordance with the manufacturer's instructions.

3.03 TESTING

- A. Test the medium dual catenary lighting system in accordance with the latest edition of FAA Advisory circular AC 150/5345-43.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This item consists of furnishing all labor, equipment, supplies, and material in performance of all operations required for site clearing, grubbing and clean-up operations.

1.2 RELATED REQUIREMENTS

- A. Section 31 23 19 Dewatering and Control of Surface Water.
- B. Section 31 23 00 Excavation and Fill.

1.3 DEFINITIONS

- A. Clearing: Includes cutting all brush, trees and stumps, to within 6 inches of natural ground, chipping and disposing of the cuttings. Clearing also includes the removal of all snow and ice in the project area.
- B. Grubbing: Includes the removal and disposal of all stumps, roots, organics, buried logs, brush and other objectionable material or debris not otherwise indicated to remain.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall perform all clearing and grubbing operations where designated on the Contract Drawings and as specified herein or as directed by the owner.
 - 1. Locate, identify and protect utilities from damage.
 - 2. Verify with the Owner any vegetation to remain.
- B. The project site contains miscellaneous debris including connexes, inoperable construction equipment, construction material, and debris. Contractor shall coordinate with the City as necessary to relocate all materials, waste, and equipment that interfere with proposed improvements to approved offsite location.

3.2 PROTECTION

- A. Provide protection as necessary to prevent damage to existing improvements and utilities indicated to remain.
 - 1. Protect improvements on adjoining properties and on project site.
 - 2. Protect trees, plant growth and features designated to remain. Protect survey benchmarks, property corners, survey monuments and existing work from damage or displacement.
- B. All property corners, benchmarks or other permanent survey marker disturbed during construction shall be removed and recorded. The contractor shall be responsible for the resurvey and resetting of any disturbed property corners, benchmarks or other permanent survey markers by a professional land surveyor, licensed by the State of Alaska.

3.3 USE AND DISPOSAL OF GRUBBED MATERIAL

- A. Cleared and grubbed material shall be disposed of at a Contractor furnished disposal area.
- B. Except as otherwise stated, the Contractor shall make his/her own arrangements and assume all cost in connection with disposal sites. Disposal sites shall be located and maintained in such a manner as to prevent a public nuisance.
- C. If the disposal site is located on private land, the Contractor shall obtain written permission from the property owner or owners for such disposal sites and shall furnish the Project Manager with a copy of this permission. The written permission shall specifically provide that the property owner will not hold AVEC, its employees, agents, or engineers liable for use or damage to this property. The Contractor shall be held liable for any trespass and property damage incurred outside of the disposal site.

END OF SECTION

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This item consists of furnishing all labor, equipment, supplies, and material in performance of all earthwork operations including construction of access road(s), permanent laydown area, and power house pad.
- B. Important Notes:
 - 1. Contractor shall make his own determination of the adequacy of the site to support equipment and other construction loads. Additional fill material and/or rig mats may be required to support loads during construction and Contractor shall provide additional fill and/or rig mats as required at no additional cost to the Owner.

1.1 RELATED REQUIREMENTS

- A. Division 01 Specifications.
- B. Section 02 32 00 Geotechnical Investigations.

1.2 QUALITY CONTROL ASSURANCE

- A. Testing Procedures and Methods:
 - 1. Moisture-Density test standard: ASTM D1557 or AASHTO T-180, Method D.
 - 2. In-place Density Determination: Nuclear Method ASTM D2922 or AASHTO T-238.
 - 3. Gradation Analysis: ATM T-7, ASTM C136 or AASHTO T-27.
 - 4. Other testing procedures and methods referenced in individual specification sections.
- B. Quality Control Monitoring:
 - 1. Contractor shall secure and pay for all required quality control monitoring. Contractor shall utilize Project Manager approved, certified, independent laboratory and field personnel for all required testing.
 - 2. Provide certified test results as required in Section 1.3, Submittals.

3. Fill material placed prior to Project Manager Approval of test results is at the sole risk of the Contractor. Material not meeting requirements shall be removed and replaced at Contractor's expense.
- C. Minimum testing requirements are indicated below.
1. Moisture Density and Gradation Analysis:
 - a. Classified Fill: Two (2) samples shall be taken at each Classified Fill material source to be used in the work. One (1) additional sample shall be taken when any change in material occurs which, in the opinion of the Engineer, may significantly affect the optimum moisture content or maximum laboratory dry density.
 - b. If laboratory tests indicate that the fill material does not meet the specification requirements, the Contractor shall provide additional certified tests for alternative fill material sources at no additional cost to the Owner.
 2. In-Place Density:
 - a. One (1) test for every 200 cy of embankment fill placed (Minimum of one test per lift is required regardless of fill quantity).
 - b. The results of each density test shall be recorded on a test sheet. The following information shall be recorded.
 - 1) Horizontal and vertical location.
 - 2) Density and percent of referenced standard compaction.
 - 3) Material description and appropriate compaction control standard.
 - c. If test results indicate insufficient compaction, Contractor shall cease placement of fill and provide additional compaction effort and/or moisture conditioning until subsequent in-place density testing indicates proper compaction has been achieved.
 - d. All costs associated with additional in-place density testing as a result of failed tests shall be borne by the Contractor.

1.3 SUBMITTALS

- A. Submittals shall be made in accordance with the General Conditions, Division 1, and this Section.
- B. Provide the following submittals:
 1. Name of proposed independent certified testing laboratory and field testing subconsultant.
 2. Format of proposed laboratory and field test forms.
 3. Laboratory results of gradation and moisture density tests for each fill type to be used on the project.
 4. If the Contractor changes the source and/or stockpile from which

materials are obtained, Gradation Analysis and Moisture-Density test reports for these new sources shall be submitted to the Project Manager.

5. Results of all in-place density field tests.
 6. Catalog and manufacturer's data sheets for proposed compaction equipment.
 7. Disposal plan for unusable excavation.
- C. Additional Testing:
1. All testing necessary for the Contractor to locate acceptable sources of classified or unclassified fill material for the project shall be provided by the Contractor at no additional cost to the Owner.
 2. During construction, the owner may elect to have further gradation and compaction testing completed on the materials being furnished by the Contractor. This testing shall be at the expense of the Owner. The Contractor shall provide material samples as may be necessary to complete this testing and these material samples shall be furnished from material available on the Project site or from the Contractor's source and/or supplier.

1.4 MATERIAL SOURCES

- A. It is the responsibility of the contractor to select a material source for the project and supply material that meets the requirements for Classified Fill materials.
- B. The Contractor shall coordinate as necessary with the borrow pit surface and subsurface property owners, shall acquire all necessary permits and/or material sales agreements, and shall pay all required fees, royalties, and other costs associated with pit access and material extraction.
- C. The Contractor shall be responsible for all costs associated with locating, procuring, transporting, testing, storing, placing and compacting fill material for the work. The Owner is not responsible for fill lost during transportation.

PART 2 - PRODUCTS

2.1 UNCLASSIFIED EXCAVATION

- A. Excavation from the project area shall be considered unclassified. Complete all excavation regardless of the type, nature or condition of the materials encountered as shown on the drawings and/or at the Project Manager's direction.
- B. Excavation conforming to the specifications for Classified Fill Materials may be reused. Unclassified excavation intended for reuse shall be stockpiled and

tested prior to placement in the work.

- C. Dispose of unusable excavation at a location provided by Contractor and approved by Owner.

2.2 CLASSIFIED FILL MATERIALS

- A. Fill Material shall meet the requirements for Classified Fill material listed below.

- B. Classified Fill:

- 1. Classified fill material shall consist of mineral soil, free from dirt, muck, frozen chunks, clay balls, roots, organic material, debris, or deleterious material. It shall have a liquid limit no greater than 25 and a plasticity index no greater than 6 as determined by AASHTO T-89 and T-90.

- 2. Type I classified fill material:

Type I classified fill material shall conform to the following gradation as determined by AASHTO T-27:

U.S. Standard <u>Sieve Size</u>	Percent Passing, <u>by Weight</u>
4 inch	100
2 inch	85-100
No. 4	20-60
No. 200	3-12

- 3. Type II classified fill material shall be crushed gravel consisting of sound, tough, durable rock fragments of uniform quality and shall meet the following requirements:

Degradation Value (ATM T-13):	45 Min
Percent Fracture (ATM T-4):	50 Min (Single Face)

Type II classified fill material shall conform to the following gradation as determined by AASHTO T-27:

U.S. Standard <u>Sieve Size</u>	Percent Passing, <u>by Weight</u>
1 inch	100
No. 4	35-65
No. 10	25-45
No. 200	4-10

- C. Pipe Bedding Material: Use Type II classified material.

PART 3 - EXECUTION

3.1 GENERAL

- A. Safety – The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain excavation sideslopes and prevent sloughing to ensure that persons working in or near the excavation are protected.
- B. Notify Project Manager of any discrepancies between Contractual requirements and site conditions prior to start of Work.
- C. Maintain subgrade, backfill and embankment areas or lifts open until testing is complete and testing requirements are met, or approval of testing is secured from the Project Manager.
- D. Any work covered up prior to test completion and achieving testing requirements or Project Manager's approval shall be excavated and reconstructed at Contractor's expense.
- E. Work in inclement weather is at Contractors risk. Any materials which become unstable as the result of improper moisture content, improper selection of techniques, equipment, or operations during inclement wet weather shall be replaced at Contractor's expense.
- F. Excavations and embankment shall be accomplished in such a manner that drainage is maintained at all times; any areas not so drained shall be kept free of standing water by pumping if necessary.
- G. The Contractor shall provide for the proper maintenance of traffic flow and accessibility as may be necessary, and shall also make adequate provisions for the safety of property and persons.
- H. No separate payment for any excavation shall be made. All excavation shall be incidental to the Bid Item being performed.

3.2 EXCAVATION

- A. Excavate to lines and grades shown on the Contract Drawings. Remove and dispose of all topsoil, dirt, muck, frozen chunks, clay balls, roots, organic material, debris, or deleterious material.
- B. At Contractor's option, unclassified excavation may be stockpiled and tested for conformance with classified fill specifications. See Part 1 of this specification for testing requirements.
- C. Disposal of Excess Excavation:
 - 1. Dispose of all excess excavated materials offsite. Contractor shall

- make arrangements for the disposal of the excavated material and bare all costs incidental to such disposal.
2. Sideslopes of excavation waste piles shall be sloped to match the materials natural angle of repose, or flatter.
 3. Excavation waste areas shall be completely within the limits of the disposal area property.
- D. Dewatering:
1. Excavate all materials in a dewatered condition unless approved otherwise by the Project Manager.
 2. Dewatering shall be performed in accordance with the requirements of Section 31 23 19, Dewatering and Control of Surface Water.
- E. Unauthorized Excavation:
1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or neat-line dimensions without written direction by the Project Manager.
 2. Unauthorized excavation, as well as remedial work as directed, shall be at Contractor's expense.
 3. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification.

3.3 SITE PREPARATION

- A. Clear and grub the construction area in accordance with Section 31 11 00 of the Specifications and the Contract Drawings.
- B. Project area must be fully thawed (no seasonal frost) prior to placement of fill.
1. Prior to placement of fill Contractor shall demonstrate that ground is frost free by excavating one or more test pits as directed by the engineer.
 2. Minimum test pit depth shall be 8 feet.
 3. If frozen soils are encountered, the Project Manager shall be notified and the test pit shall be filled. At the discretion of the Engineer additional time shall be allowed for the ground to thaw. Subsequent test pits shall be dug a minimum of 10 ft horizontal from previous pits.
- C. Fill all depressions or holes below the general area surface level, whether caused by test pits, removal of debris or unacceptable material, or otherwise. Fill with Classified material as shown on the drawings, and compact to specified density and to a level, uniform surface before the placement of subsequent layers.

- D. Sloped ground surfaces steeper than 1 vertical to 4 horizontal on which embankment is to be placed shall be plowed, benched, or broken up in such manner that the fill material will bond with the prepared surface.

3.4 EMBANKMENT CONSTRUCTION

A. Embankment Fill Placement:

1. The specified material shall be placed at the locations and to the lines and grades indicated on the Contract Drawings. The material shall be placed and spread uniformly in successive layers not exceeding eight (8) inches in loose thickness. The Project Manager may approve lifts of greater thickness provided the equipment and method used will consistently achieve the specified density. The layers shall be carried up full width from the bottom of the fill to avoid the necessity of widening the edges after the center has been brought to grade. Each layer shall be compacted in accordance with Section 3.5 of this Specification.
2. Blading, rolling, and tamping shall continue until the surface is smooth, free from waves and irregularities, and conforms to elevations shown on the Contract Drawings. If at any time the material is excessively wet; it shall be aerated by means of blade graders, harrows, or other suitable equipment until the moisture content is satisfactory. The surface shall then be compacted and finished as specified above.
3. Oversized material shall be removed. Portions of any layer in which the embankment material becomes segregated shall be removed and replaced with satisfactory material or shall be added to and remixed to secure proper gradation as directed by the Project Manager. No separate payment will be made for any material removed or regraded in areas where material becomes segregated.

3.5 COMPACTION

- A. Compact each embankment lift to 95% of maximum density at optimum moisture content as determined by ASTM D1557 or AASHTO T-180, Method D.
- B. Correct improperly compacted areas or lifts if soil density tests indicate inadequate compaction.
- C. Portions of any lift in which the materials become segregated to the extent that the required percent compaction cannot be attained, shall be removed by the Contractor and replaced with satisfactory materials, or blended with additional material until segregation is eliminated and specified percent compaction is attained.

- D. If, in the opinion of the Project Manager, based on testing service reports and inspection, subgrade and layers of embankment that have been placed are below specified density, the Contractor shall perform additional compaction and testing at elevations directed by the Project Manager until specified density is obtained, at no additional cost to the Owner.
- E. The Contractor shall be responsible for providing the proper size and type of compaction equipment and for selecting the proper method of operating said equipment to attain the required compaction density.

3.6 GRADING

- A. Existing ground contours shown on the Contract Drawings are based upon limited survey information and are approximate.
- B. Finished surfaces shall be not more than 0.10 foot above or below the finished grade elevations shown on the Contract Drawings; soft spots or settling areas shall be corrected at Contractor's expense. Feather finish grades to match adjacent existing roads and parking surfaces where required.

3.7 MAINTENANCE

- A. As necessary, Contractor shall water the site while grading is in progress to control dust.
- B. Contractor shall protect newly graded areas from traffic and erosion and keep free of trash and debris.
- C. Contractor shall repair and re-establish grades in settled, eroded and rutted areas as directed by the Project Manager.
- D. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- E. All open excavations shall be adequately signed and barricaded to protect the public.

3.8 DENSITY TEST RECORD DOCUMENTATION

- A. The results of each density test shall be recorded on a test sheet. The following information shall be recorded.
 - 1. Horizontal and vertical location.
 - 2. Density and percent of referenced standard compaction.
 - 3. Material description and appropriate compaction control standard.

END OF SECTION

SECTION 31 23 19
DEWATERING AND CONTROL OF SURFACE WATER

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This Section describes the requirements for dewatering and the control of surface water during construction.

1.2 SYSTEM DESCRIPTION

- A. Dewatering and temporary diversion works shall be designed by and be the sole responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Selection of equipment and materials to perform the work is at the option of the Contractor.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall make his own provisions for diverting surface run off, alleviating ponding water, and dewatering excavation when ground water is encountered.
- B. Contractor shall be responsible for coordinating, acquiring, and paying for all permits required for dewatering operations.
- C. Remove ponded water and limit water flowing or infiltrating into the work area to the extent that the quality of work is not compromised.
- D. Surface water flows within the work area shall be diverted by constructing temporary ditches, berms, or other means to control and direct the water away from the work; use of pumping equipment may be required to dewater some areas.
- E. Discharge from dewatering operations shall be returned to natural drainage routes. Settling pits, silt fences, straw dikes, or other appropriate measures shall be taken to prevent highly turbid waters from entering existing ponds, streams, or wetlands.

END OF SECTION

SECTION 31 62 16

HELICAL PILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes installed steel helical pipe piles.

1.3 DEFINITIONS AND CLASSIFICATIONS

- A. Pile: Unless stated otherwise "pile" or "piles" refer to steel helical pipe piles
- B. Helical Pier: A manufactured steel foundation, with one or more helical bearing plates, that is rotated into the ground and utilized to resist applied axial (compression or tension), lateral loading and overturning moments from structures, within specified settlement, uplift, or deformation tolerances.
- C. Test Pile: An individual pile which is tested, observed and approved under dynamic load tests.
- D. Production Piles: Piles that are purchased and delivered for incorporation in the permanent structure.
- E. ASTM: American Society for Testing and Materials
- F. AWS: American Welding Society

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Helical piling strength data, including torque strength rating, ultimate compressive capacity, helix ultimate strength and ultimate tension strength.
 - 2. Information demonstrating that product components comply with various specified material and testing standards.
 - 3. Product Testing Reports.
 - 4. Submit product data, including manufacturer's product sheet, shop drawings, diagrams and specifications for specified products. Information shall show

compliance with ASTM, torque and strength requirements, prior to Architect/Engineer s authorization for shipping.

- B. Shop Drawings: For steel helical piles. Show fabrication and installation details for piles, including details of end caps, splices, helices, and pile caps.
 - 1. Submit scaled, dimensioned details of lead and extension sections, including helix configuration and coupling configuration. Show connector sizes and locations.
 - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 3. Include sequential installation layout and location of all indicator, test and reaction piles.
 - 4. Pile numbering shall match contract documents.
 - 5. Include arrangement of pile reaction frames (if used), test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by a qualified professional engineer responsible for their preparation.
- C. Manufacturer's Mill Certificate: Certify that pier shaft and helix material meets or exceeds specified requirements.
- D. Welding certificates.
- E. Installation Equipment: Torque motor, drive tool and torque indicator specifications.
- F. The Contractor shall submit a helical pile installation plan detailing equipment and methodology for installation of the helical piles.
- G. Calibration reports for equipment, including hydraulic jack, pressure gauges, and deflection dial gauges.
- H. If required, the Contractor shall submit, for review and acceptance by the Owner, the proposed load testing procedure. The proposal shall provide the minimum following information:
 - 1. Type of load and measuring equipment.
 - 2. Prescribed loading program and criteria.
 - 3. General description of load reaction system, including description of reaction anchors or bearing plate.
- I. The Contractor shall maintain and submit helical anchor installation and as-built records as referenced in Sections 3.11 and 3.12 below.
- J. The Contractor shall submit welding certifications for personnel performing field welding, reference Section 2.2 below.
- K. The Contractor shall submit a helical pile installation plan detailing equipment and methodology for installation of the helical piles.
- L. Calibration reports for equipment, including hydraulic jack, pressure gauges, and deflection dial gauges.

- M. If required, the Contractor shall submit, for review and acceptance by the Owner, the proposed load testing procedure. The proposal shall provide the minimum following information:
 - 1. Type of load and measuring equipment
 - 2. Prescribed loading program and criteria
 - 3. General description of load reaction system, including description of reaction anchors or bearing plate
- N. The Contractor shall maintain and submit helical anchor installation and as-built records as referenced in Sections 3.11 and 3.12 below.
- O. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

1.5 QUALITY CONTROL AND ASSURANCE

- A. Helical Pier design based on geotechnical report prepared by Golder Associates, dated February 9, 2018. This geotechnical report is provided for information only.
- B. Pre-installation Conference: Conduct conference at Project Site.
- C. ASTM International:
 - 1. ASTM A36/A36M - Carbon Structural Steel.
 - 2. ASTM A123/A123M - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 3. ASTM A153/A153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 4. ASTM A-252-98 Standard Specification for Welded and Seamless Steel Pipe Piles
 - 5. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - 6. ASTM A500/A500M - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - 7. ASTM A563 - Carbon and Alloy Steel Nuts
 - 8. ASTM A1018/A1018M - Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - 9. ASTM D-3689 Standard Test Methods for Deep Foundations Under Static Axial Tensile Load
 - 10. ASTM D-3966-07 Standard Test Method for Piles under Lateral Loads
 - 11. Static Axial Compressive Load
- D. International Code Council Evaluation Service (ICC ES):

1.6 PERFORMANCE REQUIREMENTS

- A. Install helical piers to a measured torque resistance and minimum depth below ground surface as specified on the Structural Drawings and in section 3.5 below.

1.7 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Pile Installation Records.

1.8 QUALIFICATIONS

- A. Installer Qualifications: Company specializing in helical pier installation with minimum 5 years documented experience..
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel."
- C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall store materials to permit easy access for inspection and identification and keep materials off ground by using pallets, platforms, or other supports.
- B. Materials shall not be stacked face to face. Wood blocks or Styrofoam padding or other suitable materials shall be used to separate sections or components. The helical piers shall be stored horizontally to prevent metal contact between helical piers.
- C. Materials shall be protected from damage, weathering, corrosion and deterioration.

1.10 OTHER GENERAL REQUIREMENTS

- A. Contractor shall be prepared to handle on-site soil conditions, including but not limited to organic silt, silt, and sand, in all of which frozen soil can be present at the Project location. Contractor shall perform such work as necessary to accommodate soil conditions. No additional payment shall be allowed for such work.

PART 2 - PRODUCTS

2.1 HELICAL PIER ASSEMBLIES

- A. 2-7/8" Helical Piers: Subject to compliance with requirements, provide the following:

1. Riser, lead section, and extensions shall be round pipe shaft complying with ASTM A500, Grade C, with minimum 50 KSI yield strength.
 2. Wall thickness shall be schedule 40 minimum.
 3. Lead sections shall have mitered point.
 4. Helix bearing plate complying with ASTM A1018, with minimum 55 KSI yield strength, and having a minimum 0.375-inch thickness, diameters and lead section configurations as shown.
 - a. Helices shall be cold-pressed to a near-perfect helical shape with 3-inch pitch, plus or minus 0.25 inches. Leading and trailing edges shall be within 0.375 inches of being parallel to each other.
 - b. Provide a three-helix diameter interhelix separation between helices.
 - c. Helices shall be welded to pipe sections using a continuous fillet weld on both sides of the helix-to-pipe connection.
 - d. At the factory, leading edge of helices shall be sharpened to minimize soil disturbance and scalloped to improve initial soil cutting during installation.
 - e. Multiple helices shall be located and formed with identical pitches on the shafts such that trailing helices shall trace the same path as the leading helix with a minimal disturbance of soil when threaded into the ground.
 5. Minimum rated strength capacities of helical pier assembly:
 - a. Installation Torsion: 3,000 ft-lbs.
 - b. Tension: 18,000 lbs design; 36,000 lbs ultimate.
 6. Coupling: Piles sections shall be joined by not less than two connection bolts through a pipe socket-type joint that is manufactured integral to the pier shaft and capable of transferring the full torsional capacity of the pier assembly between adjacent, connected sections.
 - a. Connection bolts shall comply with ASTM A325 bolts, having a minimum diameter of 0.875 inches and ASTM A563 hexagonal jam nuts.
 - b. In assembled condition, connection bolts shall be aligned perpendicular to each other and provide a snug-tight fit.
 - c. Couplings shall provide a collinear, straight and rigid connection, with a maximum tolerable slack of 0.0625 inches.
- B. 10" Helical Piers: Subject to compliance with requirements, provide the following:
1. Riser, lead section, and extensions shall be round pipe shaft complying with ASTM A500, Grade C, with minimum 50 KSI yield strength.
 2. Wall thickness shall be schedule 40 minimum.
 3. Lead sections shall have mitered point.
 4. Helix bearing plate complying with ASTM A1018, with minimum 55 KSI yield strength, and having a minimum 0.750-inch thickness, diameters and lead section configurations as shown.
 - a. Helices shall be cold-pressed to a near-perfect helical shape with 6-inch pitch, plus or minus 0.25 inches. Leading and trailing edges shall be within 0.375 inches of being parallel to each other.
 - b. Provide a three-helix diameter interhelix separation between helices.

- c. Helices shall be welded to pipe sections using a continuous fillet weld on both sides of the helix-to-pipe connection.
 - d. At the factory, leading edge of helices shall be sharpened to minimize soil disturbance and scalloped to improve initial soil cutting during installation.
 - e. Multiple helices shall be located and formed with identical pitches on the shafts such that trailing helices shall trace the same path as the leading helix with a minimal disturbance of soil when threaded into the ground.
5. Minimum rated strength capacities of helical pier assembly:
 - a. Installation Torsion: 35,000 ft-lbs.
 - b. Axial Capacity: 20,000 lbs design; 40,000 lbs ultimate
 6. Splices: All splices shall be full penetration welds with finish welds protruding less than 1/8-inch outside the pipe outside diameter.
- C. Protective Coating: All helical piling surfaces (interior and exterior) shall be hot-dipped galvanized after fabrication in accordance with ASTM A123 and ASTM A153, as applicable. No substitutions of protective coating shall be considered.
- D. Manufacturers:
 - a. Maclean Dixie HFS, Pelham, Alabama.
 - b. A.B. Chance Helical Products, Hubbell Power Systems, Centralia, Missouri.
 - c. Approved Equal.

2.2 WELDING

- A. All welding shall be performed in accordance with AWS D1.1 "Structural Welding Code – Steel".
- B. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel". All welders and operators shall be qualified within the previous 12 months.
- C. The Owner reserves the right to inspect, at any time, all materials and workmanship for compliance with this Specification including helical pile alignment, welding and surface preparation.
- D. Upon completion of all welding work the Contractor shall provide to the Owner a letter stating that all welds have been visually inspected by a qualified Special Inspector. All full (complete) penetration welds shall be tested and certified by an independent testing laboratory. Any deficiency in welding shall be repaired at the Contractor's expense.

2.3 PIER CAP AND STRUCTURAL COMPONENTS

- A. Steel fabrication shall comply with the Structural Drawings for beam saddles, pile caps and miscellaneous steel components supported by helical piles.
- B. Fabricated pier-supported components shall conform to the details shown.

- C. Protective Coating: All surfaces of steel fabrications shall be hot-dipped galvanized after fabrication in accordance with ASTM A123 and ASTM A153.

PART 3 - EXECUTION

3.1 DELIVERY AND HANDLING

- A. The Owner shall be informed seven (7) days prior to commencement of helical pile installation.
- B. All equipment required for transporting, loading and unloading of materials shall be responsibility of the Contractor.
 - 1. Protect the helical piles from damage due to excessive bending stresses, impact, abrasion or other causes.
 - 2. Implement all necessary precautions during loading, transportation, unloading, and stacking of materials, so not to bend, break, deform, or otherwise damage.
- C. All materials shall be transferred to the storage area in a safe and timely manner to prevent damage to the steel.
- D. Materials shall not be stacked face to face. Wood blocks or Styrofoam padding or other suitable materials shall be used to separate sections or components. The helical piles shall be stored horizontally to prevent metal contact between helical piles.
- E. Damage caused by handling shall be reported to the Owner. Corrective measures shall be completed as directed, at the expense of the Contractor, including repair or replacing of all damaged helical piles.

3.2 EXAMINATION

- A. Have all utilities and structures located above and underground in the area of Work.
- B. Review contract documents and any soil boring information provided to determine subsurface conditions for installing helical piers.
- C. Contractor shall notify Owner/Engineer of any condition that would affect proper installation of helical piers immediately after the condition is revealed. Contractor shall halt Work until the matter can be resolved to the mutual satisfaction of Contractor, Owner and Engineer.
- D. Contractor shall notify Owner/Engineer at least 7 days in advance of installing helical piers to allow scheduling of quality assurance observations.

3.3 SURVEY AND HELICAL ANCHOR LAYOUT

- A. The Contractor shall be responsible for all measurements that may be required for execution of the work to maintain the position and elevation as prescribed on the construction drawings.
- B. The Contractor shall furnish, at his own expense, all personnel, equipment and materials required to make any surveys as are necessary.
- C. The Contractor shall establish elevations and cut-offs required for the complete installation of all foundations and foundation embedment.
- D. The Construction drawings discrepancies in distances, elevations or coordinates shall be immediately brought to the attention of the Owner/Engineer and resolved before the start of construction/installation.
- E. The Contractor shall preserve and maintain all benchmarks and reference points established for this work. If the Contractor during the execution of the work destroys or removes any benchmarks and/or reference points, the cost of re-establishing these benchmarks and/or reference points will be charged back to the Contractor.

3.4 INSTALLATION EQUIPMENT

- A. Helical pier installation equipment shall be of a rotary type, either truck- or track-mounted, with forward and reverse capability, electric or hydraulic powered and equipped with a torque monitoring device able to provide installation torque readings on a continuous basis.
- B. Equipment shall be capable of maintaining the helical pier at the designed position and angle, with minimum drive equipment rating to equal or exceed the maximum torque rating of the specified helical pier.
- C. Equipment shall be capable of applying adequate crowd and torque simultaneously to ensure normal advancement of the helical piers.
 - 1. Torque Motor: shall provide high torque, low speed that allows helical piers to advance with minimal soil disturbance at the Work site. Motor shall speed (RPM) shall be adjustable.
 - a. Connection between the torque motor and the installation rig shall have no more than two pivot hinges, which shall be oriented perpendicular to each other.
 - b. Percussion drilling equipment shall not be permitted.
 - 2. Drive Tool: The connection between the helical pier assembly shall be collinear, straight and rigid, and shall consist of a hexagonal, square, or round Kelly bar adapter and helical pier shaft socket.
 - a. The drive tool shall be provided by the helical pier manufacturer, and shall be used in accordance with the manufacturer's installation instructions.

- b. A steel connection pin shall be provided by the helical pier manufacturer with the drive tool of proper strength and size, and join the drive tool to the helical pier shaft. The pin shall be kept in good working condition, regularly inspected for wear and replaced with a new identical pin when worn and damaged.
3. Torque Indicator: shall be used to measure installation torque, and can be an integral component of the installation equipment, or externally mounted in-line with the installation tooling.
 - a. Torque indicator shall be capable of torque measurements with a sensitivity of 500 ft-lb or less.
 - b. Torque indicator shall be calibrated prior to start of the Work and kept in calibrated condition throughout the Work. Torque indicators shall be re-calibrated if, in the opinion of the Engineer, reasonable doubt exists that the measurements are accurate.
 - c. A spare calibrated torque indicator shall be kept on-site and used in event that the primary torque indicator fails to accurately measure installation torques.

3.5 INSTALLATION

- A. Installation Damage: Helical piers that are damaged as a result of exceeding the maximum allowable torque rating during installation or helical pier that is suspected of being damaged as a result of poor workmanship or improper installation techniques shall be removed and replaced at Contractor's expense. Contractor shall rectify damage at its own expense wherever it causes excessive soil disturbance as deemed by Engineer during the installation of any helical pier.
- B. Position helical piers as indicated on drawings. Establish the proper angular alignment at station of installation. Helical piers shall be held securely and accurately in position while installing to ensure they are within specified tolerances.
- C. Safe and secure connections shall be provided to helical piers and extensions at all times.
- D. Helical piers shall be installed round, plumb and true to the required location in a manner that does not destroy the soil strength characteristics as they are installed.
 1. Constant, but not excessive, downward force ("crowd") shall be applied as to advance helical pier. The helices shall be advanced so that the helix screws or threads into the soil matrix rather than augering through the soil matrix, which would result in heavily damaged auger cuttings around the helix.
 2. Installation shall be executed in a smooth and continuous manner, at the rate of advancement equal to one pitch per revolution as to minimize disturbance to the soil during installation. The maximum rate of rotation shall not exceed 20 revolutions per minute.
 3. Under no circumstances shall helical piers be driven or pushed into the soil.
 4. Do not exceed the torsional strength rating of the helical piers. Pre-drilling shall be provided as necessary before installation to properly advance the helical piers,

- depending on soil class and conditions, including permafrost conditions, which may be present.
5. Do not damage piers during installation operations.
- E. Termination Criteria: Helical piers shall be advanced until all of the following criteria are satisfied:
1. 2-7/8" Helical Piers:
 - a. The installation torque of the final three (3) feet of helix embedment shall achieve at least 3,000 ft-lbs, and the minimum embedment depth of the top helix flight is achieved, as shown, or a greater embedment depth is provided.
 2. 10" Helical Piers:
 - a. The installation torque of the final five (5) feet of helix embedment shall achieve at least 35,000 ft-lbs, and the minimum embedment depth of the top helix flight is achieved, as shown, or a greater embedment depth is provided.
 3. Helical piers that reach their maximum torque rating before the reaching the minimum required embedment depth shall be subject to the following:
 - a. Reverse the direction of torque, thread back out the helical pier a distance of 1 to 2 feet, and attempt to reinstall by decreasing the crowd and augering through the obstruction.
 - b. Remove the helical pier and pre-drill in the same location a pilot hole having a diameter nearly equal to, but no larger than, the helical pier shaft outer diameter. After the pilot hole is drilled, reinstall the helical pier.
 - c. Terminate installation at obtained depth with written approval of Engineer.
 4. Helical piers that reach the minimum embedment depth before achieving the minimum installation torque shall be subject to the following:
 - a. Install the helical piers to a deeper embedment using additional extension sections.
- F. Cut off tops of piers to elevations indicated and prepare pier top to receive pier caps or beam saddles as shown in the Drawings.
- G. Fill annular separation between the helical pier and soil with sand and potable water slurry.
1. Slurry shall be unfrozen material sand mixed with potable water to a fully saturated state.
 2. Slurry shall be placed until the slurry no longer settles within the annular space and the slurry is dense and firm.
 3. The Architect/Engineer shall approve the slurry, slurry placement, and densification methods proposed by the contractor prior to use.

3.6 PILE LOAD TEST

- A. Pile Tests: Arrange and perform the following pile tests:

1. Static Axial Tension Load Test in accordance with ASTM D1143 – Quick Test on at least (1) 10-inch and (1) 2-7/8” helical pile. Test load shall be as recommended by the Geotechnical Engineer.
 2. The owner shall provide on On-Site special inspector to observe the load test and evaluate the load test results. The Contractor is responsible for all other elements related to the load test.
- B. The Engineer may require the Contractor to make additional load test(s) that are not indicated in the event that the behavior of the test pile or any other pile shows any peculiarity, erratic action, or otherwise causes suspicion as to the reliability of the pile capacity.
- C. Test piles that comply with requirements, including location tolerances, may be used on Project.
- D. Either extract damaged test piles and reaction piles and remove from the site, or cut them off at least one foot below finish grade and provide as-built location relative to permanent facilities.

3.7 STEEL FABRICATION AND ASSEMBLY

- A. General:
1. Comply with the Drawings.
 2. Perform welding in accordance with AWS D1.1 for shielded metal arc welding.
 3. Use only welders qualified in accordance with AWS D1.1.
 4. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
 5. Horizontal elements shall be fabricated perpendicular to vertical elements. Vertical elements shall be constructed to be installed plumb. Horizontal elements, including the overall dimensions of the platform, shall be constructed level.
 6. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth. Grind cut edges smooth and straight.
 7. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.
- B. Gas Flame Cutting: Do not use gas flame cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect/Engineer. Finish gas cut sections equal to a sheared appearance when permitted.

3.8 ERECTION TOLERANCES

- A. Maximum Variation from Vertical for Plumb Piles: 1 in 120 inches.
- B. Maximum Vertical Variation from Pile Cut-Off Elevation: 1/4 inch.

- C. Maximum Horizontal Out-of-Position at Pile Cut-Off Elevation: 1.5 inches.
- D. The Contractor shall immediately contact the Owner when a helical pile is +/- 1.5 inches or more off the centerline. Methods to modify or replace the out-of-position helical pile will be determined and the Contractor shall execute the modifications or replacement at no cost to the Owner.
- E. Helical piles that are installed more than 6 (six) inches off centerline will be automatically rejected, unless otherwise accepted by the Owner/Engineer.

3.9 DAMAGED AND DEFECTIVE HELICAL PILES

- A. Unacceptable helical piles are defined as piles that are placed out of position (vertical and/or horizontal) or damaged. The Owner shall reserve the right to accept or reject questionable helical piles.
- B. Rejected helical piles shall be removed and replaced with new helical piles as directed by the Owner. No extra compensation shall be given to the Contractor for the removal, replacement or other work made necessary due to the rejection of a defective helical pile.

3.10 FIELD PAINTING

- A. Surface Preparations: Clean field welds and galvanized surfaces to be painted. Remove loose rust and loose mill scale, spatter, and flux deposits. Prepare surface in accordance to SSPC-SP 1. Galvanized surfaces to be painted shall also be cleaned and etched with spray application "Clean 'n Etch" by Great Lakes Laboratories or approved equal. Spray treatment shall be performed in accordance with manufactures requirements for galvanized surface preparations.
- B. Paint exposed portion of helical piers above grade in accordance with Section 09 90 00.

3.11 CLEAN UP

- A. The construction site shall be restored to its original condition.
- B. All underbrush or trees damaged during the drilling operation shall be completely removed and properly disposed of.
- C. All drill tailings shall be removed from the site or buried and the surface profile shall be restored to its original condition

3.12 HELICAL PILE PRE-INSTALLATION SUBMITTALS

- A. Helical pile installation work shall be performed in accordance with the signed and sealed drawings, by a registered professional engineer, and denoted "Issued for Construction".
- B. The Contractor shall submit to the Owner a brief description of the installation of the helical pile foundations including the field control and alignment methods.
- C. All proposed materials and procedures for repair work shall be submitted to the Owner for approval at least 24 hours prior to commencement of any repair work.
- D. The Contractor shall obtain written approval from the Owner when using replacement materials.
- E. The Contractor shall submit to the Owner the schedule specifying the helical pile installation sequencing; including the start date, the daily work hours, and the estimated completion date.

3.13 FIELD QUALITY CONTROL

- A. Pile Installation Records: Maintain accurate installation records for each pier, compiled and attested to by a qualified professional engineer. Include the following data:
 - 1. Project name and number.
 - 2. Name of Contractor.
 - 3. Pile location in pile group and designation of pile group.
 - 4. Pile dimensions.
 - 5. Pile identification number and stationing.
 - 6. Ground elevation.
 - 7. Final pier embedment depth.
 - 8. Elevation of helices after installation.
 - 9. Final cutoff elevations of piles after installation.
 - 10. Elevations of splices.
 - 11. Records of re-installations.
 - 12. Date and time of installation.
 - 13. Weather conditions and ambient air temperature.
 - 14. Installation inclination angle with respect to vertical.
 - 15. Offset distances from the surveyed centerline.
 - 16. Torque installation records on all helical piles including torque monitoring calibration data. Installation torque records shall include the maximum installation torque and the average torque over the final three (3) feet of embedment for 2-7/8" helical piers and five (5) feet.
 - 17. Helical pile load testing results (if required).
 - 18. Any difficulties observed during helical pile installation.
 - 19. Any other pertinent information.

- B. Unacceptable Piles: Piles that fail tests, are placed out of position, are below cut-off elevations, or are damaged.
- C. Special Inspections: Owner has engaged a qualified special inspector and testing agency to perform special inspections on the helical pile foundations.
- D. Tests and Inspections: Contractor shall provide approved, third party inspection services as described below:
 - 1. Pile Testing: See section 3.6.
 - 2. Weld Testing: In addition to visual inspection, welds shall be tested and inspected according to AWS D1.1/D1.1M and one or more inspection procedure listed below, at testing agency's option. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Radiographic Inspection: ASTM E 94, minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.
 - 3. Investigate any sudden decrease in installation resistance for possible breakage of the pile. If a sudden decrease in installation resistance cannot be correlated to boring data or some incident in the installation, and if the pile cannot be inspected, such decrease in installation resistance will be cause for rejection of the pile.

3.14 Provide additional piers or replace piers to conform to specified requirements.

END OF SECTION

SECTION 31 62 17

H-PILE FOUNDATIONS

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes supplying all labor, materials, tools, and equipment required to install the specified H-piles to the indicated depths.

1.02 SUBMITTALS

- A. Submit in accordance with Section 01300, Submittals, of the General Requirements.
- B. Preliminary Submittals: Within fourteen (14) days of the Contract award and prior to starting construction, submit a written description of all equipment and techniques proposed for use in the installation of the piles; include a description of access, provisions to prevent construction equipment from damaging the ground surface, boardwalks, or adjacent structures, manufacturer's specifications for the pile hammer including type, energy capacity, and operating instructions, procedures for driving piles, procedures for penetration of obstructions, and procedures to relieve soil friction in the event soil consolidation prevents piles from being driven to the specified depth.
- C. Submittals Required After Installation.

Accurately record the following data for each driven pile and submit to the Engineer daily:

1. Project name, contract name and number, and contractor name.
2. Location of pile (structure number).
3. Time driving started and ended, including any times when driving stopped.
4. Pile type and size.
5. Driven depth of pile below adjacent grade.
6. Height of top of pile above adjacent grade.
7. Bearing strata description and elevations if pre-drilling is performed.
8. Nature and location of obstructions.
9. Type, size and rate of operation of equipment used for driving piles.
10. Continuous record of number of blows for each foot of penetration for impact hammers and the number of seconds to advance each foot for vibratory or pneumatic hammers.
11. Measurement data for plumbness and coordinates of pile drive point if different than shown on the plans.
12. Description of pre-drilling methods and result of pre-drilling.

13. Record of all deviations in methods and results.
 14. Description of pile tip, if used.
- D. **Welding Procedures.** Submit written welding procedures, including sketches if applicable, for the Engineer's review. The welding procedures shall describe the means and methods by which the Contractor shall perform the welding. Detailed welding procedures shall be developed for and at the expense of the Contractor by the Testing Institute of Alaska or other qualified testing laboratory approved by the Engineer. Welding procedures shall cover such items as welding methods, backing plate metal if required, filler materials, pile splice joint design, preheating base metals, etc.
- E. **Welder Qualifications.** Provide documentation of individual welder's certification to the Engineer at least three days prior to performing permanent field welding.

1.03 QUALITY CONTROL

- A. **Qualifications and Inspections.** Contractor shall qualify his welding procedures in accordance with American Welding Society (AWS) D1.1. All welders shall be qualified in accordance with AWS D1.1, specifically for the materials used on this project.
- B. An approved independent testing laboratory shall certify qualifications of the welding procedures and welders.
- C. Piles shall be transported, stored and handled by the contractor at the site in a manner that will not result in pile shaft bowing (sweep). All piles shall be visually inspected prior to installation for conformance with the contract specifications.

PART 2 – MATERIAL

2.01 WELD MATERIAL

Weld materials shall have 15 feet-lbs. energy Charpy V-notch absorption at – 20°F as tested in accordance with American Society for Testing and Materials (ASTM) A370 and A673.

PART 3 - EXECUTION

3.01 EQUIPMENT

- A. **Driving Equipment:** The Contractor shall furnish equipment of sufficient size and capacity to install the piles as specified without damaging piles or adjacent structures. Equipment shall be suitable for installing each pile without the need for splicing. A single acting diesel pile hammer capable of developing 30,000 to 40,000 ft-lb energy is recommended. Specifications for equipment with energy ratings above or below 30,000 to 40,000 ft-lb energy shall be submitted for review and approval by the engineer. The equipment shall be maintained in good operating condition at all times during installation and shall be able to operate at its full-rated capacity. Pre-drilling and thawing equipment shall be made available by the Contractor as necessary.
- B. **Driving Caps:** Impact hammers shall be equipped with cast steel or structural steel driving caps, with grooved bases conforming to the pile shape. The head of the pile shall fit square in the hammer, but the driving cap should not restrain the pile from rotating. Pile hammer cushion and drive cap configuration shall be included in the submittal,
- C. **Driver Leads:** Fixed or rigid type pile driver leads that will hold the pile firm in position and alignment, and in axial alignment with the hammer, shall be used. The leads shall be extended to within two feet of the elevation at which the pile enters the ground. A free lead system may be approved by the Engineer, provided a reliable performance record with free lead systems is demonstrated by the Contractor.

3.02 PREPARATION

- A. **Pile Tips:** The piles may be driven without pile tips or shoes unless the Contractor deems them necessary to prevent pile damage. The outside diameter of pile tips or shoes, if used, shall not be larger than the outside diameter of the pile.
- B. **Pile Length Markings:** Each pile's length shall be marked with horizontal lines at one-foot intervals and the number of feet from the tip at five-foot intervals with white or orange indelible marker. After pile driving is completed, the ground line shall be marked on the pile with a yellow indelible marker.
- C. **Pile Splicing:** Pile splices are not permitted without the prior approval of the engineer. Approved pile splices shall be made with the top of the driven pile section at least three feet above the ground to permit inspection of the welded connection. Splice shall be a full penetration butt weld welded in accordance with the approved welding procedure.

3.03 INSTALLATION

- A. **Driving Piles.**
 - 1. Piles shall be installed at locations indicated on the pile/pole coordinate schedule provided by the Engineer.
 - 2. Each pile shall be driven without interruption until full depth is obtained.

3. Protect the pile head during driving. Provide full bearing on the piles for distribution of the hammer blow. Do not damage piles during driving operations.
 4. Pre-drilling and thawing, if required, shall be performed by the Contractor at no additional cost to the Owner. The diameter for the pre-drill shall not exceed four inches for H-piles.
 5. All spoils from pre-drilling shall be disposed of in accordance with US Army Corps of Engineers Nationwide Permit #12. Do not distribute spoils in streams or drains.
 6. Carefully maintain pile centerline location. Carefully plumb leads and pile before driving. Pulling the pile into position after driving has started is not permitted.
 7. When handling and driving piles, take special precautions to ensure against overstress or leading away from a true position when driving.
 8. Should any obstructions be encountered which threaten to damage a pile so as to make it unsuitable or cause a pile to drift from its required location, cease driving and immediately notify the Engineer.
 9. Pile driving shall be considered complete when the following requirements are achieved. Penetration rates for dense or firm soils and refusal rates will be determined from the driving equipment specifications.
 - a. The pile is driven to 50 feet depth below ground line and in accordance with the project drawings, and
 - b. The last twenty feet of pile installation has penetration rates indicating dense or firm soils
- B. Damaged or Misdriven Piles:
1. Damaged piles and piles driven outside required driving tolerances will not be accepted and shall be removed and, if necessary, a new pile shall be furnished at no additional cost to the Owner. Damaged piles are defined as piles that exhibit variations beyond mill tolerance limits.
 - a. Piles rejected after driving may be withdrawn and reinstalled at the correct location provided they are not damaged.
 - b. Backfill voids left by withdrawn piles that will not be filled by new piles, The backfill material shall be compatible and suitable for providing a dense, supportive soil mass, free of voids, not frozen, and shall be approved by the Engineer. Backfill shall be placed in the void left by withdrawn pile in layers not exceeding six inches in depth, with each layer mechanically tamped before the next layer is added. The backfill shall be compacted to a density equal to or greater than that of the surrounding undisturbed soil.

2. Cutting Off:
 - a. Driven piles that are approved for splicing shall have their tops cut off if they are distorted from driving. No more than six inches of pile length shall be cut off for splice welds.
 - b. Cuts shall be neat and square to the axis of the pile. Pile ends shall be beveled if required by the approved welding procedure. Dispose of excess materials as required by local and state law.
- C. Welding:
 1. All welding shall conform to the requirements of AWS D1.1.
 2. If the ambient temperature is below 32°F or conditions are windy, a shelter maintained at a minimum temperature of 32°F shall be provided to enclose the area where welding is being performed.
 3. Flux coated welding electrodes shall be purchased in hermetically sealed containers. Immediately after opening of the sealed container, electrodes shall be stored in ovens at temperatures specified in the approved welding procedure and AWS D1.1. Electrode exposure to the atmosphere shall not exceed the time specified in the approved welding procedure and AWS D1.1. Electrodes that have been wet shall not be used.
 4. Base metal shall be preheated as specified in the approved welding procedure.
 5. Splices, where approved by the Engineer, shall be welded to produce a straight pile alignment through the splice and developing full strength of the pile in both tension and bending.
- D. Tolerances:
 1. Install piles within the following maximum tolerances:
 - a. Location of pile: Pile center point shall be within three (3) inches of specified pile coordinates.
 - b. Pile variation from vertical: a maximum 1-inch per 10 feet of vertical.
 - c. Top elevation of piles: plus or minus three inches.

END OF SECTION

SECTION 33 71 00
ELECTRICAL UTILITIES

PART 1 - GENERAL

1.01 SCOPE

- A. This Specification describes the minimum acceptable standards for overhead distribution line construction.
- B. The staking sheets are included in the Bid Documents.
- C. Any modified RUS Construction Units or any new construction units are included on the detail sheets in the project drawings. Any standard RUS Construction Units referenced on the drawings or staking sheets shall be obtained by the Contractor. The lack of having the correct RUS construction unit drawing will not be acceptable as an excuse for an incorrect installation.
- D. The drawings and specifications are complementary. What is shown on one is binding whether shown or specified in the other or not. Failure to check both the drawings and the specifications will not be grounds for a change order if additional equipment or material is required to be provided by the Contractor after the Engineer reviews, or deficiencies are identified during testing, either in the Factory or the field.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. All other Division 1, 23, 26, and 33 Specifications

1.03 Codes and Standards

- A. Codes: Perform all work in strict accordance with all applicable national, state, and local codes; including, but not limited to the latest legally enacted editions of the following specifically noted requirements:
 - 1. ANSI-C2, National Electrical Safety Code – NESC.
 - 2. RUS Bulletin 1728F-804, Specifications and Drawings for 12.47/7.2 kV Line Construction, the Staking Sheets, Plans and Specification, and Construction Drawings.

1.04 QUALITY CONTROL

- A. All material shall be Rural Utility Service (RUS) approved and accepted.
- B. All construction work shall be done in a thorough and workman-like manner in accordance with RUS Bulletin 1728F-804, Specifications and Drawings for 12.47/7.2 kV Line Construction, the Staking Sheets, Plans and Specification, and Construction Drawings. The Contractor shall obtain a copy of these specifications and shall keep them on the jobsite.
- C. This specification supplements the RUS Bulletins identified above. Where there is a conflict, the more stringent condition shall apply. In general, standard RUS construction unit drawings have been used. However, several construction units have been modified. These

construction units are included on the drawings and have been identified with a modifier and shall be used in lieu of the similar RUS construction unit.

- D. Work shall be performed to the C2-2007 Edition of the National Electric Safety Code (NESC) except where local regulations or the specifications or drawings are more stringent, in which case the specifications and/or drawings and the local regulations shall govern.

1.05 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for all products of this section, or as indicated on the drawings, in compliance with Section 26 05 00 Common Work Results for Electrical.

1.06 DISTRIBUTING POLES

In distributing the poles, large, choice, close-grained poles shall be used for transformers, deadend, angle, and corner poles.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components.
- B. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product.

2.02 INSULATORS

- A. Insulators shall be rated 23 kV, 150 kV BIL, ANSI Class 56-1.
- B. Suspension insulators shall be ANSI Class 52-9.
- C. Insulators, pin, and spool, shall be porcelain type. Insulators shall be selected to properly accommodate the armor rod installed on the conductor.
- D. All insulators shall be RUS approved.

2.03 CROSSARMS

- A. Crossarms shall meet the requirements of RUS Spec. No. DT-5B:PE-16 solid wood, distribution type, and a 1/4 inch, 45° chamfer on all top edges. Crossarms shall be full-length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute. Pressure treatment shall be by the Copper Naphthenate or pentachlorophenol process in accordance with AWPA C4. Other treatment processes will not be accepted.
- B. Crossarm gains shall meet ANSI C135.33 requirements.
- C. Crossarms shall be 8 feet in length, unless otherwise required by the Contract Documents. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment.

Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators, and for four suspension insulators, except where otherwise indicated or required. Drilling shall provide required climbing space and wire clearances. Crossarms shall be straight and free of twists to within 1/10-inch per foot of length. Bend or twist shall be in one direction only. Crossarms shall have a stamp or nameplate indicating manufacturer, year of manufacture, species of wood, and type of treatment, and grade (close grain or dense).

- D. Crossarm braces shall be selected for the crossarm length and shall be full-length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute. Pressure treatment shall be by the Copper Naphthenate or pentachlorophenol process in accordance with AWPA C4. Other treatment processes will not be accepted.

2.04 FUSED CUTOUTS

- A. Primary-fuse cutouts shall be 15 kV, 110 kV BIL, 100A loadbreak open type construction, porcelain. NEMA B, heavy duty, 10 kA, for crossarm mounting. Open-link cutouts are not acceptable. Fuses shall be the dropout type. Fuse cutouts shall be equipped with combination mounting brackets for cutout and surge arrester, suitable for the indicated installations.
- B. Hubbell Power Systems or equal.

2.05 GANG OPERATED LOAD BREAK SWITCHES

- A. Load break switches shall meet ANSI C37.30 standards.
- B. Gang-operated load break switches shall be of the outdoor, manually operated, three-pole, single-throw type with rotating insulators and equipped with interrupters capable of load break and load make equal to switch's continuous current rating. Each switch shall be suitably preassembled for the indicated configuration and mounting. Moving contacts shall be of the high-pressure, limited area type, designed to ensure continuous satisfactory contact. Each switch shall be rated for the voltage of the system in which it is installed.
- C. Switches shall be complete with necessary operating mechanisms, handles, and other items required for manual operation from the ground, as indicated on the drawings.
- D. The control rod shall be sized and provided to properly operate the three-phase switch.
- E. Switches shall be Cooper Power Systems M-Force three-phase switch, 600 amp, 15 kV, horizontal as indicated on the drawings, with porcelain insulators, steel crossarm, ice shields, and torsional handle. Contractor shall develop the catalog number for the switch from the description herein and from the Cooper Power System information and submit the complete catalog number with the product submittals. Other manufacturers will not be accepted.
- F. See Staking Sheets for additional requirements.

2.06 CURRENT TRANSFORMERS

Outdoor current transformers shall be ABB, Type BB-15-971(H), or approved equal. Current transformer shall be 15 kV, 110 kV BIL and shall have a secondary rating of 5 amps with a primary rating as indicated on the drawings.

2.07 POTENTIAL TRANSFORMERS

Outdoor potential transformers shall be ABB, Type VOG-11, or approved equal. Potential transformers shall be rated 15 kV, 110 kV BIL and shall have a thermal rating of 1000 VA @ 30° C. Potential transformers shall have a single centered bushing with a primary voltage of 7,200 volts and a secondary voltage of 120 volts with a 60:1 winding ratio.

2.08 SURGE ARRESTERS

- A. Arresters shall be 7.65 kV, 9 kV duty cycle, distribution class, MOV type requiring no gap adjustment.
- B. Surge arresters shall be provided for protection of aerial-to-underground transitions, gang-operated load-break switches, transformers and other indicated equipment.
- C. Surge arrestors shall meet NEMA LA1 requirements for the zinc-oxide type and shall be suitable for outdoor installations. Arresters shall be equipped with mounting brackets suitable for the indicated installations.
- D. Hubbell PDV-100, no. 213708, or approved equal.

2.09 POLE LINE HARDWARE

- A. Zinc-coated hardware material shall meet ANSI C135.1, C135.14, C135.17, C135.22, and C135.33 requirements.
- B. Steel hardware material shall meet ASTM A575 and A576 requirements.
- C. All hardware shall be hot-dip galvanized in accordance with ASTM A153.
- D. All curved washers shall be cast ductile iron.

2.10 GUY ASSEMBLIES

- A. Guy material shall be minimum 7 strands, 3/8" nominal diameter, Class A zinc-coated-steel high-strength meeting ASTM A475 requirements, with a minimum breaking strength not less than 10,800 pounds or as indicated on the drawings.
- B. Guy assemblies, including insulators and attachments, shall provide a strength exceeding the required guy strength. Thimbles or thimble-eyes shall be provided on anchor points. Guy hook guy attachments shall be Hubbell catalog number GH5N, or approved equal.
- C. Holding capacities for down guys shall be based on a lead angle of 45 degrees as indicated. When field conditions prevent indicated lead angles, anchors shall be placed in other locations as approved by the Engineer.
- D. Guy deadends shall be made by using Preformed Line Products Guy-Grip deadend, or Engineer approved equal. Deadends shall be selected to

equal or exceed the rating of the RUS unit referenced in the Staking Sheets.

2.11 GUY MARKERS

- A. Guy markers shall be full round, 2-inch by 8 feet long, yellow. Markers shall be made of high density polyethylene with ultra-violet light resistance additives to protect the resin and the color from brittleness and fading. Provide vandal resistant type. Securely clamped to the guy at the bottom and top of the marker.
- B. Install red striped reflective tape on both sides of the guy guard. Install in warm environment to allow for proper adhesion.

2.12 SPLICES AND DEADENDS

- A. All splices shall be full tension automatic type, Fargo GL406A, or approved equal.
- B. Primary deadends shall be clamp type dead end shoe, Hubbell PG46N, or equal. Deadends shall be full tension rated for the conductor.
- C. Secondary service and primary neutral conductors shall be deadended using Preformed Line Products service grip deadends, suitable for the conductor provided.

2.13 POLE NUMBERS

Pole numbers shall be 2-inch high aluminum embossed with Roman typeface. Attached to pole with aluminum barbed round head nail. Pole numbers shall match the associated location in the Staking Sheet.

2.14 POLE REFLECTORS

Where indicated, install a minimum of 4 reflectors vertically on the pole. Reflectors shall be red, aluminum, 3-inch two hole mounting, acrylic.

2.15 SECONDARY OVERHEAD CONDUCTORS

- A. All secondary conductors shall be overhead service drop, multiplex, aluminum, 600 volt, 75° C rating, polyethylene insulated conductors. For each assembly, provide insulated conductors as indicated and an ACSR concentrically stranded neutral messenger. Conductors shall conform to the following standards.
 - B-230: Aluminum Wire, 1350-H19 for Electrical Purposes.
 - B-231: Aluminum Conductors, Concentric-Lay-Stranded.
 - B-232 Aluminum conductors, Concentric-Lay-Stranded, Coated Steel Reinforced (ACSR).
 - B-399: Concentric-Lay-Stranded 6201-T81 Aluminum Alloy Conductors.ICEA S-61-402
- B. Each multiplex cable shall be provided in the sizes indicated in the Staking Sheets or on the drawings. Cables shall be provided based on

the standard Code Word for the specific cable. Cables shall be provided as follows:

1. Duplex Conductors:
Cables utilized for lighting or other 120 volt service. Cable shall consist of one insulated conductor and one neutral.
2. Triplex Conductors:
Cables utilized for single phase service or other uses as indicated on the drawings. Cable shall consist of two insulated conductors and one neutral ACSR.
3. Quadruplex Conductors:
Primarily used for three-phase service. Shall be provided with three insulated conductors and one neutral ACSR. Conductors shall be marked for easy phase identification.

2.16 SUPPORT BRACKETS AND TRANSFORMER MOUNTS

Support mounts for three-phase transformer installations shall be Aluma-form wing cluster mounts, model 3MW-24-M-L. Cluster mounts shall be suitable for the transformers installed.

2.17 PRIMARY METER MOUNTS

Primary meter mounts shall be Aluma-form, model Model PMM-6 (3 Position) for mounting six pieces of equipment, or as indicated on the drawings.

2.18 RAPTOR PROTECTION

- A. Raptor protection shall be provided as indicated on the Staking Sheets and specified herein.
- B. Raptor protection material shall be Preformed Line Products Raptor Protector products.

PART 3 - EXECUTION

3.01 GENERAL

- A. Materials to be used for construction are designated by one or two lower-case alphabetic characters shown on the drawings and in the "ITEM" column in the drawing material blocks. For example, "b" designates a steel, pole top pin.
- B. Normally crossarm pins and post-type insulators come equipped with washers and locknuts. Thus, the washers and locknuts for crossarm pins are not tallied in the "QTY" (quantity) columns in the material boxes on the construction drawings. However, the crossarm pin washers and locknuts are shown on the construction drawings in parenthesis to depict proper construction. If crossarm pins or post type insulators are purchased without washers, locknuts or studs, the quantity totals in the material boxes on the construction drawings will need to be adjusted accordingly.

- C. Locknuts shall be installed on all threaded material and hardware in addition to nuts and washers. The threads on installed bolts shall protrude past the lock washers a minimum of one inch but not more than two inches.

3.02 SETTING POLES

- A. Where identified on the Staking Sheets, poles shall be connected to the H-pile foundation as indicated on the drawings.
- B. All direct buried poles shall be set to RUS specifications plus one foot. The minimum depth for setting poles shall be as follows:

MINIMUM POLE SETTING DEPTH	
LENTH OF POLE (FT)	SETTING IN SOIL (FT)
30	6.5
35	7.0
40	7.0
45	7.5

- C. On sloping ground, the depth of the hole shall be measured from the low side of the hole.
- D. Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two (2) poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.
- E. Poles shall be set in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line. Vertical angle structures (A3, B3, C3) shall be offset from centerline by the length of the insulator string hardware, to prevent adjacent poles from leaning into the angle.
- F. Poles shall be raked against the conductor strain not less than one inch for each ten feet of pole length, but not more than two inches for each ten feet of pole length after conductors are installed at the required tension.
- G. Pole backfill shall be thoroughly tamped the full depth. Excess dirt shall be banked around the pole.

3.03 OVERHEAD CONDUCTOR INSTALLATION

- A. Conductors shall be handled with care. Conductors shall not be tramped on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductors spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing.

- B. The neutral conductor should be maintained on one side of the pole for tangent construction and for angles not exceeding 30°.
- C. With pin-type insulators the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type insulators shall be tight on the pins and on tangent construction the top groove shall be in line with the conductors after tying in.
- D. For neutral and secondary conductors on poles, insulated brackets (Material Item 'da') may be substituted for the single and double upset bolts on angles of 0° to 5° in locations known to be subject to considerable conductor vibration. All conductors shall be cleaned thoroughly by wire brushing before splicing or the installation of a connector or clamp. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

3.04 SAGGING CONDUCTORS

- A. Conductors shall be sagged evenly and in accordance with the conductor manufacturers' recommendations. The air temperature at the time and place of sagging shall be determined by a certified etched glass thermometer.
- B. The sag of all conductors after stringing shall be in accordance with the conductor manufacturers' recommendations, except that a maximum increase of three (3) inches of the specified sag in any span will be acceptable. However, under no circumstances will a decrease in the specified sag be allowed.
- C. The conductor shall be tensioned above the initial sag conditions. After bringing conductor to proper sag, deadends shall be secured within 2 hours. Wire shall be tied to insulators within 48 hours.

3.05 CONDUCTOR TIES

- A. All ties used shall be pre-formed type as manufactured by Preformed Line Products and conductors shall be properly attached to insulators using preformed ties.
- B. Conductor ties shall be selected to properly accommodate the armor rod installed on the conductor.

3.06 GANG OPERATED LOAD BREAK SWITCHES

- A. Install switches in accordance with the manufacturer's instructions.
- B. Switches shall be horizontal or vertical as indicated on the drawings or staking sheets.
- C. Position the operating handle at no higher than 4'-0" above grade level. If necessary, the lower operating rod shall be cut and threaded or lengthened as required to comply with the final position of the operating handle.

3.07 GRADING OF LINE

When using high poles to clear obstacles such as buildings, foreign wire crossing, railroads, etc., there shall be no upstrain on pin-type insulators in grading the line each way to lower poles.

3.08 GUYS AND ANCHORS

- A. Guys shall be placed before the conductors are strung and shall be attached to the pole per the Specifications for Overhead Distribution Line Construction.
- B. All anchors shall be helical pile type as indicated on the drawings and specified herein.
- C. Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the construction drawings.
- D. All anchors and rods shall be in line with the strain and shall be so installed that approximately six inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above the earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.
- E. Guy bonding clamps shall be installed in the eyes of all anchor rods. All guys (primary & secondary) shall be effectively grounded according to RUS specifications. On secondary poles, guys shall be bonded to the secondary neutral.

3.09 POLE LINE HARDWARE

- A. A locknut shall be installed with each nut, eye-nut, or other fastener on all bolts or threaded hardware such as insulator pins, upset bolts, double arming bolts, etc.
- B. Suitable washers shall be installed under boltheads and nuts on wood surfaces and elsewhere as required. Washers used on through-bolts and double-arming bolts shall be approximately 2-1/4 inches square and 3/16 inch thick. The diameter of holes in washers shall be the correct standard size for the bolt on which a washer is used. Square curved washers shall be used for down-guy attachments to pole. Washers for use under heads of carriage-bolts shall be of the proper size to fit over square shanks of bolts. Eye bolts, bolt eyes, eyenuts, strain-load plates, lag screws, guy clamps, fasteners, hooks, shims, and clevises shall be used wherever required to adequately support and protect poles, brackets, crossarms, guy wires, and insulators.
- C. A 3 inch by 3 inch (minimum), square, curved washer (item "d") shall be used abutting the pole when installing primary deadend, neutral deadend and guy assemblies directly to the pole. A 2-1/4 inch (minimum) square washer shall be placed under the shoulder of crossarm insulator pins whose surface area abutting the crossarm is less than 4 square inches.

3.10 SPLICES AND DEADENDS

- A. Conductors shall be spliced and deadended as indicated on the Construction Drawings. There shall be not more than one (1) splice per conductor in any span and splicing sleeves shall be located at least ten (10) feet from the conductor support.
- B. No splices shall be located in grade B crossing spans nor in the adjacent spans.
- C. Splices shall be no closer than 1,000 feet from one another and there shall be no more than three splices per mile in any primary phase or neutral conductor.
- D. Splices shall be installed in accordance with the manufacturer's specifications and recommendations.

3.11 TAPS AND JUMPERS

- A. Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not indicated, it shall be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.
- B. All aluminum to aluminum connections shall be provided with a Belleville washer.
- C. Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the construction drawings it will be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.
- D. All leads on equipment such as transformers, reclosers, etc., shall be a minimum of #6 copper conductivity. Where aluminum jumpers are used, a connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a suitable aluminum compression sleeve.
- E. All primary jumpers shall consist of #2 ACSR, or the size of the conductor.
- F. Pole tap assemblies shall be framed so that the source is on top and the load (tap) is below.
- G. In no case shall pin-type insulators be installed upside down to carry jumpers.

3.12 HOT LINE CLAMPS AND CONNECTORS

- A. Connectors and hot-line clamps suitable for the purpose shall be installed. On all hot-line clamp installations, the clamp and jumper shall be installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected.
- B. Hot-line clamps shall be used at single phase transformer connections beneath three-phase primary lines and where single phase primary taps or extends from a three-phase primary line. Where a hot line clamp is used install a stirrup clamp suitable for the conductor.
- C. Stirrups shall be aluminum, bolted with tin plated loop. Hubbell Power type AHLS, or approved equal. Size selected to fit the primary conductor and the hot line clamp.
- D. Connections to the main line shall be made with compression solderless connectors. Connectors to equipment shall be made with compression connectors bolted to the equipment pad. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire. Where ground wires are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be utilized.
- E. All conductors shall be cleaned thoroughly by wire brushing before splicing or installing connectors or clamps. A suitable oxidation inhibitor shall be applied before splicing or applying connectors over aluminum conductor.
- F. All insulated secondary to secondary connections shall be made using compression connectors which are already pre-insulated, or parallel groove connectors and plastic covers.
- G. Secondary connections at the polemount transformers shall be made up using compression type pigtails on the ends of each conductor, and then installed in a stud connector, which will be installed in the secondary bushing of the transformer, as indicated on the drawings. Inhibitor compound shall be used in all mechanical (setscrew) connections.

3.13 ARMOR RODS

- A. Armor rods shall be provided for all ACSR conductors. Armor rods shall be installed at each insulator but will not be required at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used.
- B. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. All armor rods shall be pre-formed round.

- C. The application of armor rods to the conductor shall be such that the center of the armor rods shall not deviate from the center of the conductor support by more than 2-1/2 inches.

3.14 SECONDARIES AND SERVICE DROPS

- A. Secondary conductors shall be multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturer's recommendations.
- B. Conductors for secondary underbuild on primary lines will be insulated in those instances where prevailing conditions may limit primary span lengths to the extent that covered wires or service cables may be used. Service drops shall be covered wire or service cable.
- C. Secondaries and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in any span, and splicing sleeves shall be located at least ten feet from the conductor support. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run.
- D. #4 Service drops over 140' in length shall be solidly guyed.
- E. #2 Service drops over 100' in length shall be solidly guyed.
- F. Install a wrap of tape around multi-plex cable at ends, to prevent further unraveling. Where multi-plex cable is open-ended, fold leads back and tape to mainline. Also tape the rough edges of pre-formed grips to protect the insulated leads from abrasion caused by wind vibration.
- G. Unless otherwise noted: #4 triplex may be used to service 125 amp entrances utilizing #2 copper; #2 triplex should be used to service 150-200 amp entrances utilizing #2/0 copper; #1/0 triplex should be considered for service to 200 amp entrances utilizing large resistive cooking equipment or large resistive water heaters and clothes dryers.
- H. Secondary cable shall be installed: 16" below existing bare neutral and 4'10" down on poles intended for a future primary tangent or 6'1" down on poles intended for a future primary dead-end.
- I. Where both 240/120 volt 1-phase and a higher voltage (208 or 480 volt) 3-phase secondary are to be installed, the higher voltage circuit shall be attached at least 16" above the lower voltage circuit (up to 4/0 quadruplex over 1/0 triplex, 200' maximum span).

3.15 SERVICES

- A. Service entrance by customer:

- B. Service entrance wiring shall be #2 AWG Copper for 100/125 Amp service with #6 AWG ground; #2/0 AWG Copper for 150-200 Amp service with #2 AWG ground. At least 18" wire tails shall be provided for connection to the utility system, with neutral clearly identified. Meterbase shall be mounted 5' minimum/6' maximum above grade. 2" rigid or IMC conduit riser shall be extended 3'-6" above roof line to the weatherhead, strapped every 24", and installed on gable end of house.

3.16 TRANSFORMERS

- A. Polemount transformers shall be installed and grounded according to RUS specifications. Transformers shall have at least two connections from the tank to the multi-grounded neutral conductor.
- B. All transformers will be CSP-type. Ensure that warning light covers and bulbs on the CSP transformers are not broken; replace if necessary. Provide cutouts as indicated on the drawings to provide local disconnect.
- C. Insulated trainer brackets (material item "fo") shall be used at pole transformers to secure secondary multiplex cable leads to prevent chafing due to wind movement.
- D. Transformers internally wired for 120 Volt secondary shall be labeled "120V" with reflective tags, 2.5" minimum height.

3.17 CROSSARMS

- A. Crossarms shall be bolted to poles with 5/8-inch through-bolts with square washer with locknut at each end. Bolts shall extend not less than 1/8 inch nor more than 2 inches beyond nuts.
- B. On single crossarm construction, the bolt head shall be installed on the crossarm side of the pole. Single crossarms shall be placed on opposite sides of consecutive poles.
- C. Double crossarms shall be securely held in position as indicated on the RUS Construction Units. Each bolt shall be equipped with square washers with locknuts. Double crossarms shall be provided at dead-ends, and at angles and corners as indicated, to provide adequate vertical and longitudinal strength.
- D. Tangent Arms and Buck Arms: Tangent arms and buck arms shall be set at right angles to lines for straight runs and for angles 45° and greater. Tangent arms shall bisect angles of turns of less than 45°. Dead-end assemblies shall be used for turns where shown. Buckarms shall be installed, as indicated, at corners and junction poles.

3.18 BRACES

- A. Wood braces shall be used for crossarm supports, unless specified otherwise on the construction drawings. Braces shall be Hughes Brothers type 2023 or 2045, size as indicated on the RUS Construction Units, or approved equal.
- B. Braces shall be bolted to arms with 3/8-inch carriage bolts with round or square washers with locknuts between boltheads and crossarms, and

secured to poles with 1/2-inch by 4-inch lag screws after crossarms are leveled and aligned.

3.19 GROUNDING

- A. The ground wire shall be secured to the pole with copper coated staples. The staples on the ground wire shall be spaced two (2) feet apart except for a distance of eight (8) feet above the ground and eight (8) feet down from the top of the pole where they shall be six (6) inches apart.
- B. Poles with pile foundations shall utilize the pile foundations in place of a ground rod. All poles shall be bonded to the pile, see construction unit for details.
- C. Ground rods shall be driven full length in undisturbed earth in accordance with the construction drawings. The top shall be at least 12 inches below the surface of the earth.
- D. All below grade connections and connections to the H-piles shall be made using the exothermic weld metal method.
- E. All equipment shall have at least two (2) connections from the frame, case or tank to the multi-grounded neutral conductor.
- F. The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.
- G. Ground wire sizes, not otherwise indicated, shall be not smaller than No. 4 AWG.
- H. Surge Arrester Grounding: Surge arresters shall be grounded. Ground resistance for distribution-class arresters shall be not more than 5 ohms. Ground wire connections shall be not less than #4 AWG for distribution arresters.
- I. Unless otherwise indicated, neutral conductors shall be grounded at each transformer. Also, neutral conductors shall be grounded at a point not exceeding every third pole.

3.20 WOOD POLE STORAGE AND HANDLING

- A. Wood poles held in storage for more than 2 weeks shall be stored in accordance with ANSI 05.1. Poles shall be stacked on treated skids, so arranged as to support the poles without producing noticeable distortion to any of the poles and to allow free circulation of air. The height of the piles shall be limited so as to avoid damage to poles on the bottom layers. Poles shall be piled and supported in such a manner that all poles are at least 1 foot above general ground level and any vegetation growing thereon. No decayed or decaying wood shall be permitted to remain underneath stored poles.
- B. Handling of wood poles shall be in accordance with ANSI 05.1. Poles shall not be dragged along the ground. Cant hooks, pole tongs, or other tools capable of producing indentations of more than 1 inch in depth shall not be used in handling the poles.

3.21 RAPTOR PROTECTION

- A. Where conductors are jumpered across crossarms, the conductors and insulators shall be covered with Raptor Protection material and attached with clamp type insulator.
- B. Provide construction units as indicated on the drawings for additional raptor protection.

3.22 TESTS

- A. Operating Test: After the installation is completed, the Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with the requirements herein. Tests shall be performed in the presence of the AUTHORITY or the AUTHORITY Representative. The AUTHORITY shall be notified no less than 7-days prior to test date. The Contractor shall furnish field transportation, instruments, power, tools and personnel required for the test.
- B. Ground-Resistance Measurements: Ground-resistance measurements shall be taken and certified by the Contractor. Certified test results shall be submitted to the AUTHORITY no less than 5-days prior to energization of the distribution system. No part of the electrical distribution system shall be energized prior to the receipt of written approval from the AUTHORITY of the resistance testing of that system's ground rods and grounding systems. Test reports shall indicate the location of the ground point and grounding system and the resistance and the soil conditions at the time the test was performed. When the building water service is used as a ground or part of the grounding system, ground-resistance measurements shall also be made of this connection. Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds. The resistance to ground shall be measured using the fall-of-potential method described in IEEE No. 142.
- C. Sag and Tension Test
 - 1. The AUTHORITY shall be given no less than 7-days prior notice of the time schedule for stringing conductors or cables serving overhead medium-voltage circuits and reserves the right to witness the procedures used for ascertaining that initial stringing sags and tensions are in compliance with requirements for the applicable loading district and cable weight.
 - 2. The Contractor shall submit the sag and tension method to be used and the sag tables used to achieve the proper sag. The contractor shall wait a minimum of 2 hours after stringing the conductors to allow the conductors to stabilize prior to conducting the sag and tension tests. The contractor must complete the tests within 36 hours after stringing the conductors to avoid damaging the cable. Sagging operations shall not be conducted when wind conditions prevents satisfactory sagging.

3. The span used to set the sag shall be called the sag-check span. The sag-check span shall be a level span and approximately equal to the ruling span.

END OF SECTION

SECTION 33 71 02

DISTIBUTION CONDUCTORS

PART 1 - GENERAL

1.01 SCOPE

- A. This specification describes the minimum acceptable quality of primary conductor. Where there is conflict between this specification and any other specification referred to herein, this specification shall govern.
- B. The specification herein is for the materials, design, fabrication, protective coating, and delivery of Aluminum Conductor Steel Reinforced (ACSR) conductors. This specification also describes the requirements for the design, manufacture, and delivery of the conductor.
- C. Provide sag and tension and stringing tables for each type of conductor provided, based on the conditions specified herein. Submit tables for review.

1.02 STANDARDS

All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following standards.

ASTM B-230: Aluminum Wire, 1350-H19 for Electrical Purposes

ASTM B-231: Aluminum Conductors, Concentric-Lay Stranded.

ASTM B-232: Aluminum Conductors, Concentric-Lay Stranded, Coated Steel Reinforced (ACSR).

ASTM B-500: ASTM Standard Specification for Metallic Coated Stranded Steel Core for Aluminum Conductors, Steel Reinforced (ACSR).

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.
- B. Submit the following for review:
 - 1. Each conductor type.
 - 2. Sag and stringing tables for each conductor type.

PART 2 – PRODUCTS

2.01 CONDUCTOR SPECIFICATIONS (#2 ACSR)

A. Conductor for Twin Hills Distribution.

- | | | |
|----|--|--------------|
| 1. | CODE WORD: | Sparate |
| 2. | Stranding: | 7/1 |
| 3. | Rated Strength (pounds) for overall Conductor: | 3460 |
| 4. | Overall Conductor Diameter: | 0.325 inches |
| 5. | Weight (pounds per 1000 feet): | 106.7 |

2.02 CONDUCTOR SPECIFICATIONS (#1/0 ACSR)

A. Conductor for Togiak to Twin Hills Tie-Line.

- | | | |
|----|--|--------------|
| 1. | CODE WORD: | Raven |
| 2. | Stranding: | 6/1 |
| 3. | Rated Strength (pounds) for overall Conductor: | 4380 |
| 4. | Overall Conductor Diameter: | 0.398 inches |
| 5. | Weight (pounds per 1000 feet): | 145.0 |

2.03 CONDUCTOR SPECIFICATIONS (7#8 ALUMAWELD)

A. Conductor for Togiak River Crossing.

- | | | |
|----|--|--------------|
| 1. | Stranding: | 7 |
| 2. | Rated Strength (pounds) for overall Conductor: | 15,900 |
| 3. | Overall Conductor Diameter: | 0.385 inches |
| 4. | Weight (pounds per 1000 feet): | 261.8 |

2.04 CONDUCTOR

A. The conductors shall be capable of withstanding normal handling incident to manufacture, shipment, and field installation without being deformed or abraded. Such handling includes reeling, lifting and movement of full reels, unreeling, pulling through controlled tension stringing equipment, over stringing sheaves, compression fittings and other standard accessories as required.

1. The conductor shall be Class AA stranding in accordance with Table 1 of ASTM B232.
 2. The conductor size and number of wires shall be as specified herein.
 3. The aluminum wire shall be made of 1350-H19 aluminum alloy in accordance with ASTM B230. The minimum average conductivity of the aluminum shall not be less than 61.2% IACS.
 4. The zinc-coated (galvanized) steel core wire (Class A weight coating) shall be in accordance with ASTM B498. The minimum average conductivity of the steel shall not be less than 8% IACS.
 5. The component conductors shall be made with standard right hand lay.
- B. All tension tests shall meet or exceed ASTM B498, B230, and B232. The surface of the conductors shall remain smooth, free from points, sharp edges, abrasions, or other departures from smoothness that would tend to increase radio interference and corona loss. The conductors shall be free from excessive amounts of grease, metal particles, dirt, or other foreign matter. The conductors shall not deform from the cylindrical form nor shall longitudinal smoothness be affected by strand movement when subjected to tension. Conductor components shall be formed so that there is no slack in the outer layer.

PART 3 – EXECUTION

3.01 TESTING

The MANUFACTURER shall use a statistically based quality control sampling and testing plan to assure acceptable quality levels. As a minimum, sampling and testing shall be as required by ASTM B230, ASTM B232, and ASTM B498.

3.02 SAG & TENSION AND STRINGING TABLES

The Contractor shall provide a sag table and stringing table for each conductor based on the following information prior to stringing any conductor. All costs associated with these tables shall be included in the cost of the conductor. Contractor shall submit the sag and stringing tables for review.

- A. Design Conditions:
1. NESC Heavy Loading District, 130 mph wind.
 2. Ruling Span:

Twin Hills:	160 feet.
Togiak to Twin Hills Tie-Line:	275 feet.
Togiak River Crossing:	Actual Span.
 3. Tension, Twin Hills & Tie-Line:
 - a. Initial Tension: 15% of Conductor Tensile Strength.

- b. Final Tension: 25% of Conductor Tensile Strength.
 - c. Maximum Tension: 50% of Conductor Tensile Strength.
4. Tension, Togiak River Crossing:
- a. Initial Tension: 25% of Conductor Tensile Strength.
 - b. Final Tension: 35% of Conductor Tensile Strength.
 - c. Maximum Tension: 60% of Conductor Tensile Strength.
- B. Creep is not a factor.
- C. Stringing table for Twin Hills and the Tie-Line shall provide sag and tensions at spans of 100 feet to 300 feet at a temperature range of -40° F to 100 ° F. Stringing table for the Togiak River Crossing shall provide sag and tension at the actual span at a temperature range of -40° F to 100 ° F.

3.03 CERTIFICATION

- A. Provide a certificate of compliance, signed by an authorized employee of the MANUFACTURER, that the material shipped meets the requirements of this specification and any supplementary requirements cited in a contract or order under which it was purchased.

END OF SECTION

SECTION 33 71 16

ELECTRICAL UTILITY POLES

PART 1 - GENERAL

1.01 SCOPE

This specification describes the minimum acceptable quality of wood poles. Where there is conflict between this specification and any other specification referred to herein, this specification shall govern. The poles shall be constructed in accordance with these specifications.

1.02 STANDARDS

All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following standards.

RUS Bulletin 1728F-700: Specification for Wood Poles, Stubs, and Anchor Logs.

ANSI 05.1 Wood Poles - Specifications and Dimensions.

AWPA-C4: Poles - Preservative Treatment by Pressure Processes, American Wood Preservers Association.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.

PART 2 – PRODUCTS

2.01 WOOD POLES

- A. Wood poles shall meet the requirements of ANSI 05.1 and shall be Douglas Fir drilled and gained in accordance with RUS W1.1G Pole Framing Guide. Wood poles shall have pole markings located 10 feet from pole butts. Other locations will not be acceptable. Poles shall be machine trimmed by turning smooth full length, and shall be roofed, gained, and bored prior to pressure treatment. No climbing rungs shall be provided.
- B. Poles shall be full length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute that prevents leaching. Pressure treatment shall be by the Copper Naphthenate process in accordance with AWPA C4. Other treatment processes will not be accepted.
- C. Poles exhibiting any of the following defects will not be accepted; cross-breaks (horizontal cracks), catface (scars), compound through checks, decay, double sweep (poles having sweep in two planes), hollow butts or tops, improper framing,

plugged holes (other than increment core holes), spike knots or any knot with bark inclusion, and split top.

D. Checks:

1. Checks (vertical cracks) are permitted in the top of pole except for any check more than 1/8 inch wide and extending down from the top of the pole more than 12 inches and within 30 angular degrees from the axis of the face of pole directly above ground; and any through checks or splits.
2. Through checks or splits in the butt surface of the pole are not permitted.
3. A check is considered to be continuous if it is not separated by at least 1/2 inch of wood. The maximum allowable width and length of any single check are found in Table II "Maximum Allowable Check Dimensions".

TABLE II. MAXIMUM ALLOWABLE CHECK DIMENSIONS

LENGTH OF POLE	MAXIMUM WIDTH	MAXIMUM LENGTH
30 feet	¼ inch	5 inches
35 and 45 feet	5/16 inch	5 inches
50 feet and longer	3/8 inch	8 inches

E. Knots:

1. The diameter of any single knot or sum of the diameters of all knots in any one foot section shall not exceed the limits of Table III "Maximum Allowable Knot Dimensions". Knots 1/2 inch or less in diameter shall be ignored in applying the limitations for the sum of diameters.
2. The maximum single knot in any "sworl" shall be 2 inches in diameter. Maximum sum of knots in any "sworl" shall not exceed 20% of the pole circumference at the point of the sworl or more than allowed in Table III.

TABLE III. MAXIMUM ALLOWABLE KNOT DIMENSIONS

SUMMARY OF DIAMETERS		
DIAMETER OF KNOTS IN ANY		
POLE LENGTH	ANY SINGLE KNOT	1 FOOT SECTION
45 feet and shorter	2.5 inches	8 inches
50 feet and longer	3.0 inches	10.0 inches

PART 3 – EXECUTION

3.01 CERTIFICATION

- A. Provide a certificate of compliance, signed by an authorized employee of the producer, that the material shipped meets the requirements of this specification and any supplementary requirements cited in a contract or order under which it was purchased.
- B. Provide independent inspection certification.

END OF SECTION

SECTION 33 73 13

LIQUID-FILLED UTILITY TRANSFORMERS

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers the electrical and mechanical characteristics of Single-Phase Overhead-Type Distribution Transformers. The transformers shall be designed and constructed in accordance with these specifications. All characteristics, voltage designations and tests shall be in accordance with the latest editions of ANSI Standards C57.12.26 and C57.12.00, except as modified herein.
- B. Transformers shall be designed in accordance with RUS requirements and shall be of new construction.
- C. Transformers shall have amorphous metal cores.
- D. Transformers shall be suitable for step-down service or step-up service as indicated.
- E. Quantities and ratings shall be as indicated on the drawings and staking sheets.

1.02 STANDARDS

All characteristics, definitions, and terminology, except as specifically covered in this specification, shall be in accordance with the latest revision of the following ANSI and NEMA standards.

- C57.12.00: IEEE Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.
- C57.12.20: Overhead-Type Distribution Transformers, 500 KVA and Smaller: High Voltage, 34500 Volts and Below: Low Voltage, 7970/13800Y Volts and Below.
- C57.12.35: Bar Coding for Distribution Transformers.
- C57.12.90: IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers.
- C57.12.91: Guide for Loading Mineral-Oil-Immersed Overhead and Pad-Mounted Transformers rated 500 kVA and less with 55°C or 65°C average winding rise.
- NEMA TR-1: Transformers, Regulators, and Reactors.

- NEMA TP-1: Guide for Determining Energy Efficiency for Distribution Transformers
- NEMA TP-3: Standard for Labeling of Distribution Transformer Efficiency.
- DOE: 10 CFR Part 431 – Department of Energy – Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule.
- REA: Bulletin 50-37 (D10), Specification for Rural Distribution Transformers (Overhead.)

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.
- B. Drawings shall indicate the kVA rating, dimensions, transformer impedance, voltage (both primary and secondary), phase of the transformer, and winding connecting.
- C. Provide certified test reports prior to shipment of the transformers. Test reports shall indicate the impedance, no load, and full load loss of each transformer, by serial number, and shall include the transformer efficiency, expressed in percent, of the transformer based on the test procedures specified herein.
- D. Certified test reports shall contain a statement identifying the amount of PCB in the insulating oil.

1.04 WARRANTY

The failure of any transformer due to defective design, material and/or workmanship within 12 months after being energized or eighteen months after being delivered, whichever comes first, shall be repaired or replaced without cost. Any defect in design, material and/or construction discovered within this period shall be corrected at the manufacturer's expense, either by repair or replacement.

PART 2 - PRODUCTS

2.01 RATINGS

- A. General:
1. Primary Voltage Rating: 12470/7200 volt, grounded wye.
 2. Secondary Voltage Rating: As indicated on the staking sheets.
 3. Frequency: 60 Hz.
 4. Phase: Single.

- | | | |
|----|-------------------------|---|
| 5. | Impedance: | 1% ± 5%. |
| 6. | kVA Rating: | As indicated on the staking sheets. |
| 7. | BIL Rating: 7200/12470Y | 95 kV. |
| 8. | Temperature Rating: | Self-cooled, 65° C above a 30° C ambient. |

2.02 ACCEPTABLE MANUFACTURERS

Acceptable manufactures shall be as follows. Manufacturers shall be on the RUS approved list.

- A. ABB.
- B. Cooper Power.
- C. Ermco.
- D. General Electric.
- E. Howard Transformers.
- F. Approved equal.

2.03 TRANSFORMER LOSSES

Transformer no load and load losses shall be quoted with the transformer bid and shall be guaranteed by the manufacturer. Transformer losses determined by the factory tests on the individual transformers shall be less than 10% greater than the guaranteed bid losses. No individual unit shall be shipped that exceeds guaranteed no load losses by more than 10%.

2.04 TRANSFORMER TAPS

Transformers shall be furnished with no taps.

2.05 HIGH VOLTAGE BUSHINGS AND TERMINALS

- A. Provide one high voltage bushing.
- B. The bushing terminals provided shall be tin-plated to accommodate both aluminum and copper conductors. The size of the terminals shall be 5/8". Provide terminal suitable for #8 AWG solid to #2 AWG stranded.
- C. The color of the bushings shall match Light Gray Number 70, Munsell Notation 5BG7.0/0.4.
- D. High voltage bushings shall be porcelain.

- E. Provide high voltage bushings rated at 110 kV BIL, cover mounted.

2.06 LOW VOLTAGE BUSHINGS AND TERMINALS

- A. Low voltage bushings shall be provided with the following ratings.
 - 30 kV BIL Rating.
 - 10 kV 60 Hz Dry 1-Minute Withstand Voltage.
 - 6 kV 60 Hz Wet 10 Second Withstand Voltage.
- B. The bushing terminals provided shall be clamp type to accommodate the use of screw bar post connector..
- C. Provide three porcelain bushings.
- D. The internal secondary leads shall be permanently embossed with the letters A, B, C, and D per ANSI C57.12.00 and C57.12.20.

2.07 PROTECTION

- A. Distribution transformers shall be of the completely self-protected (CSP) type. CSP transformers shall be provided with internal primary voltage fuses, direct connected primary arresters, and secondary circuit breakers.
- B. Transformers used for step-up service shall be non-CSP tupe.

2.08 CORE AND COIL

- A. Windings shall be copper or aluminum. All windings shall meet the guaranteed temperature rise requirements.
- B. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum, the windings will be energized to heat the coils and drive out moisture, and the transformer will be filled with preheated filtered degassed insulating fluid.
- C. The core shall be manufactured from amorphous metal; and shall be precisely stacked to eliminate gaps in the corner joints. Grain-oriented silicon steel, or other metals, will not be acceptable. The coil shall be insulated with B-stage, epoxy coated, diamond pattern, insulating paper, which shall be thermally cured under pressure to ensure proper bonding of conductor and paper.

2.09 TANK

- A. The tank shall include a pressure relief device as a means to relieve pressure in excess of pressure resulting from normal operation. The venting and sealing characteristics shall be as follows.
- Cracking Pressure: 10-psig \pm 2 psig.
- Resealing Pressure: 6-psig minimum.
- Zero leakage from reseal pressure to -8 psig.
- Flow at 15 psig: 35 SCFM minimum.
- B. The tank coating shall meet all requirements in ANSI C57.12.31 including.
1. Salt Spray Test.
 2. Crosshatch Adhesion Test.
 3. Humidity Test.
 4. Impact Test.
 5. Oil Resistance Test.
 6. Ultraviolet Accelerated Weathering Test.
 7. Abrasion Resistance - Taber Abraser.
- C. The tank provided shall have a recessed tank bottom which offers protection when sliding over rough surfaces.
- D. The tank shall have an internal mark, which indicates the proper oil level per Section 6.2.3 of ANSI C57.12.20.
- E. Permanently stamped secondary leads.
- F. The tank ,covering, and cover ring loops shall be stainless steel. All hardware shall be stainless steel. A bronze nut shall also be provided to eliminate corrosion problems and avoid galling. Provide a visible cover ground.
- G. Provide a drain/sampling device.
- H. Provide ground connections accepting #8 AWG solid to #2 AWG stranded. Provide a ground strap between the secondary neutral bushing and the transformer tank.
- I. The tank shall include arrester mounting pads, grounding provisions, ANSI support lugs (hanger brackets) and lift lugs. Hanger brackets shall be single.

- J. The tank color shall be ANSI 70 light gray.

2.10 INSULATING OIL

Transformers shall be provided with highly refined inhibited new mineral oil and meet the minimum requirements as specified in Table 1, "Functional Property Requirements," of ASTM D3487 and ANSI C57.106.

2.11 NOISE

Standard transformer sound level shall not exceed the values as calculated per the latest edition of NEMA Publication TR-1.

2.12 NAMEPLATES & LABELS

- A. Diagrammatic nameplate that conforms to the latest edition of ANSI C57.12.00. Impedance of the transformer shall be included on the nameplate. The nameplate shall be etched and black-filled aluminum or stainless steel. Affix to the enclosure with rivets.
- B. In addition to warning labels, provide a label indicating the transformer kVA rating on the front of the transformer, in minimum 2-1/2" black letters. Provide AVEC letter designation, as indicated on the drawings.

PART 3 - EXECUTION

3.01 TESTING AND LOSSES

- A. All units shall be tested for the following:
 - 1. No Load (Core) Losses.
 - 2. Load Losses at 85°C and rated current.
 - 3. Percent Impedance at 85°C and rated current.
 - 4. Excitation current (100% voltage) test.
 - 5. Winding resistance measurement tests.
 - 6. Ratio tests using all tap settings.
 - 7. Polarity and phase relation tests.
 - 8. Induced potential tests.
- B. The manufacturer shall provide certification for all design and other tests listed in Table 17 of ANSI C57.12.00 including verification that the design has passed Short Circuit Criteria per ANSI C57.12.00 and C57.12.90.

- C. One PDF copy of the factory certified test report of each test, in IEEE 1388 format, shall be delivered to the Engineer for review and acceptance prior to shipment of the transformers.

3.02 SHIPPING

- A. The Manufacturer shall investigate all limitations in regard to shipping the equipment to the FOB point.
- B. The transformers shall be packaged to protect them from damage during shipment, handling, and storage.
- C. Transformers shall be installed on pallets to allow loading and unloading with a forklift.

END OF SECTION

SECTION 33 77 53
MEDIUM VOLTAGE UTILITY RECLOSERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification covers the electrical and mechanical characteristics of three-phase automatic circuit recloser with axial-magnetic field vacuum interrupters encapsulated in cycloaliphatic epoxy modules. The recloser shall be designed and constructed in accordance with these specifications. Quantities shall be as indicated on the drawings.
- B. The recloser shall be a Cooper Power Systems Kyle NOVA recloser with controls and accessories specified herein.
- C. The recloser shall be capable of operation with the Schweitzer Engineering Laboratories, Inc. SEL-651R advanced recloser controller. Other controllers will not be acceptable.

1.2 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.
- B. Submit complete electrical data, mechanical and layout drawings, equipment and supports, and wiring and connection diagrams for review.
- C. Submit the Schweitzer SEL-651R recloser controller for review.
- D. Submit the SEL-651R wiring diagram for review. Show all features of the recloser controller with all inputs and equipment specified.
- E. Submit relay settings. Submit the Schweitzer SEL-651R acSELeator file with the Contractor prepared relay settings for review. Download the existing file on the relay and modify that file prior to submitting the file.

1.3 EXPERIENCE

The recloser manufacturer shall have five years' experience in the design and manufacture of reclosers, vacuum interrupters, mechanisms, and controls, along with supporting installation and operation documentation.

1.4 WARRANTY

The failure of any recloser due to defective design, material and/or workmanship within 12 months after being energized or eighteen months after being delivered, whichever comes first, shall be repaired or replaced without cost. Any defect in design, material and/or construction discovered within this period shall be corrected at the manufacturer's expense, either by repair or replacement.

PART 2 - PRODUCTS

2.1 RATINGS

- A. Maximum Design Voltage, kV 15.5
- B. Basic Insulation Level (BIL), kV 125

C.	60 Hz Withstand Voltage, kV	
	Power Frequency	38.
	Power Frequency (open interrupters):	45.
D.	Continuous Current Rating, Amps RMS	630.
E.	Making Current, Asymmetrical Peak:	31,000 amperes.
F.	Making Current Asymmetrical RMS:	20,000 amperes.
G.	Interrupting Rating, Symmetric, Amps	12,500
H.	Input Voltage (external):	120/208 volt, wye.
I.	Control Voltage:	120 volts, single-phase

2.2 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers shall be as follows. Other manufacturers will not be considered.
1. Cooper Power Systems Kyle NOVA recloser.

2.3 STANDARDS

- A. The recloser covered by this specification shall be manufactured and tested in accordance with ANSI C37.60, IEEE, IEC, and NEMA Standards.
- B. The manufacturing facility shall be independently certified to meet ISO 9001 Standards.

2.4 MECHANICAL LIFE

The unit shall be designed for 2,500 complete open/close operations. An operation is defined as an open and close operation, returning the mechanism contacts to the original state.

2.5 RECLOSER FEATURES

- A. The recloser shall use cycloaliphatic epoxy for insulation material and provide complete encapsulation of the internal vacuum interrupter. No insulation fillers such as SF₆ or foam insulation are acceptable. The encapsulation shall also be completely bonded to the source and load side terminals, eliminating any gaskets, O-ring, or other sealing methods.
- B. The solid polymer insulation shall be highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light. No coatings are acceptable.
- C. The solid dielectric insulation shall contain no environmentally hazardous or toxic components.
- D. Molding system shall utilize Automatic Pressure Gelation (APG) for casting.
- E. A single break on each phase is accomplished by separating contacts inside the vacuum interrupter using axial-magnetic interrupters.
- F. The interruption mechanism is operated by a dual coil magnetic actuator, which uses a low-voltage power source for operation.

- G. The mechanism shall support reclose intervals of 0.3, 2, and 2 seconds for a four-trip operation sequence.
- H. The mechanism shall perform consistently with uniform opening and closing times with control cables from 7 to 125 ft.
- I. The recloser shall consist of an aluminum mechanism housing that contains a magnetic actuator, which provides linear trip-and-close motion to three encapsulated vacuum interrupter modules.
- J. SF₆ gas or foam is not acceptable for insulation medium.
- K. SF₆ gas is not acceptable for an interrupting medium.
- L. Operating temperature range shall be -40°C to +65°C.
- M. The mechanism cabinet shall be designed to permit access for service.
- N. Current interruption shall occur in vacuum interrupters, providing long contact life while eliminating the production of toxic by-products.
- O. Three embedded current transformers designed for recloser controls shall provide current sensing.
- P. The mechanism shall include a yellow operating handle to manually trip the recloser. The operating handle shall remain in the down position when tripped and electrically disable any closing from the control.
- Q. A contact position semaphore shall be mounted on the bottom of the recloser for access viewing from 360 degrees.
- R. A four-digit mechanical operations counter shall be included on the bottom of the recloser for easy viewing.
- S. The recloser shall have a parallel groove-type ground connector mounted to the recloser housing rated for wires sizes #10-#2.
- T. The recloser shall be integrated with the control system using separable weatherproof connectors at the recloser and at the control.
- U. The recloser shall have a version to provide dead line closing functionality.

2.6 RECLOSER CONTROL

Recloser control shall be accomplished by using the Schweitzer Engineering Laboratories, Inc. SEL-651R microprocessor based recloser control. Other manufactures shall not be considered. The SEL-651R shall be provided with the following features:

- A. Dual door (side mount), painted, 304 stainless steel enclosure, with 3-point latches.
- B. 300 volt maximum voltage inputs.
- C. One amp phase, 0.2 amp neutral current inputs.
- D. Two, 10/100Base-T, Ethernet communications ports.
- E. 120 volt power supply.
- F. 12 volt, 40 A-hr battery.

- G. Universal fuse block for incoming voltage.
- H. Accessory shelf.
- I. Door switch. Wire the door switch to a spare input for remote annunciation.
- J. Ethernet radio as specified below.
- K. Suitable sockets and control cable interface for control cable to recloser.
- L. Cabinet heater.
- M. Security straps and security sleeve, 2", as required.
- N. Provide other accessories as may be required to provide a complete and operational system.

2.7 ETHERNET RADIO

- A. Provide a Schweitzer Engineering Laboratories, Inc. SEL-3060 Ethernet Radio. The radio shall be the SEL-3060, no alternates will be accepted. Provide the radio with the following features:
 - 1. 2.4 GHz ISM band.
 - 2. Shelf mounted. Provide all shelves and accessories required for a fully outfitted system.
 - 3. Power radio from the 12 VDC battery in the SEL-651R. Provide a disconnect switch to isolate the radio from the batter voltage.
 - 4. 15 dBi enclosed Yagi enclosed antenna. Provide all recommended antenna supports for the antenna. All brackets shall be stainless steel. If required, provide a galvanized rigid conduit or pipe support.
 - 5. Provide radio surge protector. Ground the surge protector as recommended by the manufacture.
 - 6. Provide antenna cable as recommended by the manufacture. Provide all connectors and other equipment required for a fully functional and operational system as recommended by the manufacture.
- B. Provide and install two Ethernet radios as indicated on the drawings.

2.8 ACCESSORIES

Provide the following accessories with the recloser:

- A. Provide a 19-pin control cable plug and receptacle with length of cable suitable for the installation.
- B. Provide 2-hole flat pad terminals.
- C. Provide a pole-mounting hanger with line and load arrester mounting brackets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install recloser in accordance with manufacturer's instructions. Provide grounding as recommended by the manufacture.

- B. All cables shall plugs and ports shall be treated with a compatible conductive grease lubricant to inhibit corrosion.
- C. Power the recloser and controller from the remote A-phase PT supply voltage.
- D. Test the recloser in accordance with the manufacture's recommendations.
- E. Install the Ethernet radio antennas as high as possible on the poles.
- F. Obtain system data, both generation and distribution, from AVEC and, along with the tie-line and Twin Hills systems, perform a short circuit analysis of the system to the farthest location in Twin Hills. Use this to determine the set points for the relay.
- G. Prepare and submit relay settings for the SEL-651R for review. At a minimum, provide the following elements shall be set.
 - 1. Time-overcurrent elements, phase and ground.
 - 2. Voltage elements.
 - 3. Reclosing. Set the recloser for one reclose.
 - 4. In the trip logic, set the relay to open the recloser on loss of any phase of Togiak voltage.
 - 5. Provide close logic as follows in addition to other required logic:
 - a. Set the recloser to close only if Togiak voltage is available.
 - b. Set the recloser to prevent closing if voltage is present from the Twin Hills side of the recloser.
- H. Install the approved relay settings in the relay and verify that the recloser operates at all of the specified conditions. Inject current and potential sources into the relay to verify the set points. Provide the appropriate testing equipment to perform the tests and fully test the relay prior to energizing from the primary power supply.

3.2 SHIPPING

- A. The Manufacturer shall investigate all limitations in regard to shipping the equipment to the project site.
- B. The equipment shall be packaged to protect it from damage during shipment, handling and storage.

END OF SECTION

SECTION 33 77 53.01
MEDIUM VOLTAGE VACUUM SWITCH

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification covers the electrical and mechanical characteristics of three-phase medium voltage vacuum with axial-magnetic field vacuum interrupters encapsulated in cycloaliphatic epoxy modules. The switch shall be designed and constructed in accordance with these specifications. Quantities shall be as indicated on the drawings.
- B. The vacuum switch shall be a Cooper Power Systems Kyle Type VCS-3, with controls and accessories specified herein. Other switch types or manufacturers are not acceptable.

1.2 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 Common Work Results for Electrical.
- B. Submit complete electrical data, mechanical and layout drawings, equipment and supports, and wiring and connection diagrams for review.

1.3 EXPERIENCE

The recloser manufacturer shall have five years experience in the design and manufacture of reclosers, vacuum interrupters, mechanisms, and controls, along with supporting installation and operation documentation.

1.4 WARRANTY

The failure of any recloser due to defective design, material and/or workmanship within 12 months after being energized or eighteen months after being delivered, whichever comes first, shall be repaired or replaced without cost. Any defect in design, material and/or construction discovered within this period shall be corrected at the manufacturer's expense, either by repair or replacement.

PART 2 - PRODUCTS

2.1 RATINGS

- A. Maximum Design Voltage, kV 15.5.
- B. Basic Insulation Level (BIL), kV 125.
- C. Radio Noise Limit (Microvolts): 100 @ 9.4 kV.
- D. 60 Hz Withstand Voltage, kV
 - Power Frequency 38.
 - Power Frequency (open interrupters): 45.
- E. Continuous Current Rating, RMS 200 amperes.
- F. Making Current, Asymmetrical Peak: 31,000 amperes.

- | | | |
|----|----------------------------------|-----------------------------|
| G. | Making Current Asymmetrical RMS: | 20,000 amperes. |
| H. | Interrupting Rating, Symmetric: | 12,500 amperes symmetrical. |
| I. | Phase-to-Phase Creepage: | 28.25 inches. |
| J. | Phase-to-Ground Creepage: | 24.75 inches. |
| K. | Control Voltage: | 120 volts, single-phase. |

2.2 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers shall be as follows. Other manufacturers will not be considered.
1. Cooper Power.

2.3 STANDARDS

- A. The recloser covered by this specification shall be manufactured and tested in accordance with ANSI C37.66, IEEE, IEC-265-1, and NEMA Standards.
- B. The manufacturing facility shall be independently certified to meet ISO 9001 Standards.

2.4 MECHANICAL LIFE

The unit shall be designed for 10,000 complete open/close operations without maintenance. An operation is defined as an open and close operation, returning the mechanism contacts to the original state.

2.5 VACUUM SWITCH FEATURES

- A. The vacuum switch shall use cycloaliphatic epoxy for insulation material and provide complete encapsulation of the internal vacuum interrupter. No insulation fillers such as SF₆ or foam insulation are acceptable. The encapsulation shall also be completely bonded to the source and load side terminals, eliminating any gaskets, O-ring, or other sealing methods.
- B. The solid polymer insulation shall be highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light. No coatings are acceptable.
- C. The solid dielectric insulation shall contain no environmentally hazardous or toxic components.
- D. Molding system shall utilize Automatic Pressure Gelation (APG) for casting.
- E. A single break on each phase is accomplished by separating contacts inside the vacuum interrupter using axial-magnetic interrupters.
- F. The mechanism shall perform consistently with uniform opening and closing times with control cables from 7 to 125 ft.
- G. The vacuum switch shall consist of an aluminum mechanism housing that contains a magnetic actuator, which provides linear trip-and-close motion to three encapsulated vacuum interrupter modules.
- H. SF₆ gas or foam is not acceptable for insulation medium.
- I. SF₆ gas is not acceptable for an interrupting medium.

- J. Operating temperature range shall be -40°C to +65°C.
- K. The mechanism cabinet shall be designed to permit access for service.
- L. Current interruption shall occur in vacuum interrupters, providing long contact life while eliminating the production of toxic by-products.
- M. The mechanism shall include a yellow operating handle to manually trip the recloser. The operating handle shall remain in the down position when tripped and electrically disable any closing from the control.
- N. A contact position semaphore shall be mounted on the bottom of the recloser for access viewing from 360 degrees.
- O. A four-digit mechanical operations counter shall be included on the bottom of the recloser for easy viewing.
- P. The vacuum switch shall have a parallel groove-type ground connector mounted to the recloser housing rated for wires sizes #10-#2.
- Q. The vacuum switch shall be integrated with the control system using separable weatherproof connectors.

2.6 ACCESSORIES

Provide the following accessories with the vacuum switch:

- A. Provide an 8-pin control cable plug and receptacle with length of cable suitable for continuous length of cable from vacuum switch to module switchgear.
- B. Provide 2-hole flat pad terminals.
- C. Provide a pole-mounting hanger.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with the manufacturer's instructions.
- B. Verify the operation of the vacuum switch for all specified conditions.
- C. Test the vacuum switch in accordance with the manufacturer's instructions.

3.2 SHIPPING

- A. The Manufacturer shall investigate all limitations in regard to shipping the equipment to the project site.
- B. The equipment shall be packaged to protect it from damage during shipment, handling and storage.

END OF SECTION