

Project Manual For:

**Tuluksak Power Plant Upgrade Project
Project No. 26070**



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

Advertising Date: April 14, 2026

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ALASKA ENERGY AUTHORITY

INVITATION TO BID

for Construction Contract

Date April 14, 2026

Tuluksak Power Plant Upgrade, Project No. 26070

Location of Project: Tuluksak, Alaska
Contract Officer: Selwin C. Ray
Issuing Office: Alaska Energy Authority (Authority)
State Funded [] Federal Aid [x]

Description of Work: This Department of Energy, Denali Commission, and State of Alaska funded contract is for the complete renovation of an existing power plant including building renovation; installation of new owner furnished generators; renovation of existing switchgear; replacement and renovation of various mechanical and electrical systems; and other improvements in the community of Tuluksak, Alaska as described herein and shown in the Drawings. The Contractor shall furnish all labor, materials, supervision, equipment, tools, transportation, quality control, and supplies required to complete the work.

The Engineer's Estimate is between **\$1,500,000** and **\$2,500,000**

All portions of the work shall be substantially completed by dates indicated in Section 01 11 13 - Summary of Work.

Bidders are invited to submit single bid, for furnishing all labor, equipment, and materials and for performing all work for the project described above.

Bids will be opened publicly on **May 5, 2026** at **2:00 PM** local time. The bid opening will be conducted telephonically. Potential bidders may attend telephonically by calling **1-469-810-0642** and when prompted enter Conference I.D. **931 339 780#**.

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 MARKED AS FOLLOWS:

Bid for Project:
Tuluksak Power Plant Upgrade
Project No. 26070

ATTN: Selwin C. Ray, Contract Officer
Alaska Energy Authority
813 West Northern Lights Blvd.
Anchorage, AK 99503

Mailed Bids, amendments or withdrawals transmitted must be received at the above specified address no later than 4 hours prior to the scheduled time of bid opening. **Hand-delivered bids**, amendments or withdrawals must be received in the **Bid Drop Box in front of the Alaska Energy Authority**, prior to the scheduled time of bid opening. **Emailed bid** amendments or withdrawals must be received in the email inbox prior to the scheduled time of bid opening, addressed to:

Selwin C. Ray, Email: AEAProcurement@akenergyauthority.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) 771-3035

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:

Dawn M. Molina, Project Manager Phone: (907) 771-3904 Email: DMMolina@akenergyauthority.org

All questions relating to bidding procedures should be directed to:

Selwin Ray
Contract Officer
813 West Northern Lights Blvd.
Anchorage, AK 99503

Phone: (907) 771-3035 (907) 771-3055 Email: AEAProcurement@akenergyauthority.org

The Bid Calendar, Planholder lists, and Bid Results information are available on the Internet at:
<http://www.akenergyauthority.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.

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."

Special Notice to Bidders

1. A non-mandatory pre-bid meeting is scheduled for **April 23, 2026, 2:00 PM**. The pre-bid meeting will be conducted telephonically. Potential bidders may attend telephonically by calling **1-469-810-0642** and entering the conference I.D. **217 052 991#**. If calling in, please be respectful of other callers and call from a phone that can be muted so as to cancel out background noise and the possibility of feedback. Contact the Contract Officer, Selwin C. Ray, at (907) 771-3035 for more information. This is not a mandatory meeting, and there will not be a scheduled site visit prior to the bid opening.
2. The funding for this project is exempt from the Build America, Buy America Act and therefore this solicitation is NOT subject to Buy America Preferences for Infrastructure Projects, 2 CFR 184. The project funding is a combination of DOE 40101d Grid Resilience funding, as well as state, local and Denali Commission non-federal match. The DOE Grid Resilience funds are exempt from BABA preference requirements pursuant to DOE's 8/18/23 DOE Tribal General Applicability waiver which waives all BABA preference requirements. All non-federal match is also subject to the DOE Tribal General Applicability waiver.

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)
5. **Debarment Certification (See Federal Assurances 00 90 00)**
6. **Lobbying Certification (See Federal Assurances 00 90 00)**

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)**

FEDERAL EEO BID CONDITIONS

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246). FOR ALL NON-EXEMPT FEDERAL AND FEDERALLY-ASSISTED CONSTRUCTION CONTRACTS TO BE AWARDED IN THE STATE OF ALASKA

1. Definitions. As used in these specifications:
 - a. “**Covered area**” means the geographical area described in the solicitation from which this contract resulted;
 - b. “**Director**” means Director, Office of Federal Contract Compliance Programs (OFCCP), United States Department of Labor (DOL), or any persons to whom the Director delegates authority;
 - c. “**Employer**” identification number” means the Federal Social Security number used on the Employer’s Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. “**Minority**” includes:
 - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaska Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the DOL in the covered area, either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades that have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor’s or subcontractor’s failure to make good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7(a) through 7(p) of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally-assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any OFCCP office or from federal procurement contracting officers.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period of an approved training program and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligations to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the DOL. The Contractor shall provide notice of these programs to the sources compiled under 7(b) above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendent, general foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and dispositions of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-used toilet, necessary changing facilities and necessary sleeping facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontractors from minority and female construction contractors and suppliers, including circulations of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations 7(a) through 7(p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any or more of its obligations under 7(a) through 7(p) of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.)
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any subcontract with any person or firm debarred from government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the OFCCP. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunities. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic apprentice, trainees, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that the existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws that establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Programs).
16. The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
17. The Contractor shall provide written notification to the Department, for all subcontracts documents as follows: the name, address and telephone number of subcontractors and their employer identification number; the estimated dollar amount of the subcontracts; estimated starting and completion dates of the subcontracts; and the geographical area in which the contract is to be performed.

This written notification shall be required for all construction subcontracts in excess of \$10,000 at any tier for construction work under the contract resulting from this project's solicitation.
18. As used in the Bid Notice, and in the contract resulting from this project's solicitation, the "covered area" is the State of Alaska.

PROPOSAL
of

NAME _____

ADDRESS _____

To the CONTRACTING OFFICER, ALASKA ENERGY AUTHORITY:

In compliance with your Invitation To Bid dated **April 14, 2026**, 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

Tuluksak Power Plant Upgrade Project
Project No. 26070

Located at **Tuluksak , 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 of the effective date of Notice to Proceed and to Substantially Complete the work by the **date indicated in Section 01 11 13 - Summary of Work** 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

**Tuluksak Power Plant Upgrade
Project No. 26070**

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 on 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. In case of error in the extension of prices in the bid, the unit prices will govern.

Contract award shall be made based on the Total Base Bid. AEA reserves the right to award none or any number of alternates in any order in the best interest of the State.

Bidders are required to bid on all bid items. Conditioned or qualified bids will be considered non-responsive.

Bid Item	Description	Lump Sum Price
1	Base Bid	\$
2	Additive Alternate #1	\$
3	Additive Alternate #2	\$

See Specification Section 01 11 13 Summary of Work and Drawings for detailed descriptions of each bid item.

2. Acknowledge all addenda

Addendum No	Date Issued	Addendum No	Date Issued	Addendum No	Date Issued

3. BIDDER’S NOTICE: By signature on this form, the Bidder certifies that:

- a. The price(s) submitted are independent and without collusion.**
- b. The Bidder will comply with the laws of the State of Alaska;**
- c. The Bidder will comply with applicable portions of the Federal Civil Rights Act of 1964;**
- d. The Bidder will comply with the Equal Employment Opportunity Act and the regulations issued there under by the State and Federal Government; and**
- e. The Bidder has reviewed all terms and conditions in this Invitation to Bid.**

If any Bidder fails to comply with any of these requirements, the Authority may reject its bid, terminate the contract, or consider the Vendor in default.

Company Submitting Bid	Telephone Number
Address	Fax Number
Authorized Signature	E-mail Address
Print Name	Alaska Business License number: _____ EXPRES DATE: _____
	Alaska Contractor's Registration # _____ EXPRES DATE: _____

End of Bid Schedule.

ALASKA ENERGY AUTHORITY

BID BOND

For
Tuluksak Power Plant Upgrade
Project No. 26070

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.

CONSTRUCTION CONTRACT
Tuluksak Power Plant Upgrade
Project No. 26070

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,

Substantially Completed by: **Date indicated in Section 01 11 13 - Summary of Work**

Final Completion: **Date indicated in Section 01 11 13 - Summary of Work**

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 **Five Hundred Dollars (\$500.00)** per day for each calendar day elapsing between the time stipulated for the completion and the actual date of completion up to a maximum of **\$10,000 (20 days)** 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
Tuluksak Power Plant Upgrade
Project No. 26070

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
Tuluksak Power Plant Upgrade
Project No. 26070

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.

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
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 - 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
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- ARTICLE 5 BONDS AND INSURANCE, AND INDEMNIFICATION
 - 5.1 Delivery of Bonds
 - 5.2 Bonds
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- 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
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 - 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
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- 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
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- 7.1 Laws to be observed
- 7.2 Permits, Licenses, and Taxes
- 7.3 Patented Devices, Materials and Processes
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- 7.7 Business Registration
- 7.8 Professional Registration and Certification
- 7.9 Local Building Codes
- 7.10 Air Quality Control
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- 7.13 Preferential Employment
- 7.14 Wages and Hours of Labor
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ARTICLE 8 OTHER WORK

- 8.1 Related Work at Site
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ARTICLE 9 CHANGES

- 9.1 AUTHORITY's Right to Change
- 9.2 Authorization of Changes within the General Scope
- 9.3 Directive
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- 10.1 Contract Price
- 10.2 Claims for Price Change
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- 10.4 Cost of the Work
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- 11.1 Commencement of Contract Time; Notice to Proceed
- 11.2 Starting the Work
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- 12.1 Warranty and Guaranty
- 12.2 Access to Work
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- 13.1 Schedule of Values
- 13.2 Preliminary Payments
- 13.3 Application for Progress Payment
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- 13.10 Substantial Completion
- 13.11 Access Following Substantial Completion
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- 13.13 Final Completion and Application for Payment
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- 13.15 Final Acceptance
- 13.16 CONTRACTOR's Continuing Obligation
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- 14.1 AUTHORITY May Suspend Work
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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 1 of the Specifications which contain administrative and procedural requirements as well as requirements for temporary facilities which apply to Specification Divisions 2 through 16.

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.

Procurement Manager/Officer - The person authorized by the Contracting Officer to 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 present such to the Contracting Officer, to modify or terminate 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.

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 AUTHORITY 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 in 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 acknowledge 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.”

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SECTION 00 80 00 SUPPLEMENTARY CONDITIONS

MODIFICATIONS TO THE GENERAL CONDITIONS 00 70 00

The following supplements modify, change, delete from, or add to Section 00 70 00 "General Conditions", 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 construction 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-4.3-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-4.7 – SURVEY CONTROL

At General Conditions Article 4.7, delete the section in its entirety.

SC-5.4.3 – INSURANCE REQUIREMENTS

At General Condition Article 5.4.3 add the following:

- "d. 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."

SC-5.4.2 b- COMMERCIAL GENERAL LIABILITY INSURANCE

At General Conditions Article 5.4.2.b, remove and replace the last sentence with the following:

"The following parties shall be named as "Additional Insured" under all liability coverages listed above:

- The Authority
- The State of Alaska
- The Denali Commission
- The Tuluksak Traditional Power Utility

SC-5.4.2d- BUILDER'S RISK INSURANCE

At General Conditions Article 5.4.2.e the following additional insurance is added:

Inland Marine Cargo Insurance: Contractor shall provide Inland Marine Cargo Insurance for the full value of all Owner Furnished materials in transport. Minimum coverage amount shall be \$500,000.

SC – 6.13 – SUBCONTRACTORS

Add new general conditions Article 6.13.7 as follows:

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

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

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

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

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

1. Cancel the Contract after Award without any damages accruing to the AUTHORITY; or
2. After notice and hearing, assess a penalty on the bidder in an amount not exceeding 0 percent of the value of the subcontract at issue.

SC-7.14 – WAGES AND HOURS OF LABOR

General Condition Article 7.14.1 (Certified Payroll) and Article 7.14.3 (D.O.L. Notification of Work) shall not apply to work in Tuluksak. This is because the Tuluksak Traditional Power Utility is not a political subdivision of the State of Alaska and therefore this work is not subject to AS 36.05. However, the work in Tuluksak is subject to Federal Davis Bacon wage rate requirements. See SC-90.4.

General Condition Article 7.14.2 (Alaska Little-Davis-Bacon Wage Rates) shall not apply to work in Tuluksak. This is because the Tuluksak Traditional Power Utility is not a political subdivision of the State of Alaska and therefore this work is not subject to AS 36.05. However, the work in Tuluksak is subject to Federal Davis Bacon wage rate requirements. See SC-90.4.

SC-9.4 – CHANGE ORDER

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-10.6.2 – CONTRACTOR’S FEE

At General Conditions Article 10.6.2 delete in its entirety and replace with the following:

”The following maximum rates of cost markup (to cover both overhead and profit of the CONTRACTOR) shall be used in the negotiation of a Cost of Work 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).”

SC-11.3 – COMPUTATION OF CONTRACT TIME

At General Conditions Article 11.3.3, delete the subsection in its entirety.

SC – 11.5 – EXTENSION DUE TO DELAYS:

At General Conditions Article 11.5, delete paragraph in its entirety and replace with the following:

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, acts or restraints of governmental authorities affecting the project or directly or indirectly prohibiting or restricting the furnishing or use of materials or labor required; inability to secure materials, machinery, equipment or labor because of priority, allocation or other regulations of any governmental authorities, 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.

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 Substantial Completion date has passed, the AUTHORITY shall deduct \$500 from progress payments up to a maximum of \$10,000 (20 days).

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 – 13.5 – STORED MATERIALS AND EQUIPMENT

At General Conditions Article 13.5, add the following;

“No payment will be made for an individual/unique item of material or equipment with a total value less than \$25,000 per item or for any item of material or equipment scheduled for incorporation into the work in less than 60 days from its arrival on site.”

MODIFICATIONS TO THE FEDERAL ASSURANCES 00 90 00

The following supplements modify, change, delete from, or add to Section 00 90 00 "Federal Assurances". Where any Paragraph, Subparagraph, or Clause of the Federal Assurances is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Paragraph, Subparagraph, or Clause shall remain in effect.

SC-90.1–BREACHES AND DISPUTE RESOLUTION

At Federal Assurances Paragraph 90.1 delete the paragraph in its entirety. See General Conditions 00 70 00 Article 15 for Claims and Disputes

SC-90.2 – TERMINATION

At Federal Assurances Paragraph 90.2 delete the paragraph in its entirety. See General Conditions 00 70 00 Article 14 for Suspension of Work and Termination.

SC-90.4–DAVIS-BACON ACT, AS AMENDED

Federal Davis Bacon wage rates apply to this work. The current prevailing wage determination issued by the Department of Labor can be found at this location
<https://sam.gov/wage-determination/AK20260001/0>

The Department of Energy (DOE) has additional Federal Davis Bacon wage requirements. The Contractor shall post in a prominent place at the Job Site the applicable wage determination(s) and Department of Labor Publication: WH-1321, Notice to Employees Working on Federally Assisted Construction Projects. Additionally, the Contractor and Subcontractors are required to file weekly electronic certified payroll reports via DOE's LCPTTracker platform, refer to:
<https://www.energy.gov/infrastructure/weekly-dba-payroll-tracking-lcptracker>

END OF SECTION

**ALASKA ENERGY AUTHORITY
SECTION 00 90 00
FEDERAL ASSURANCES**

Because this contract is funded with federal funds, the following contract provisions shall apply, where applicable, to all work performed on the contract by the contractor's own organization and by subcontractors. As provided in this 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 subcontracts or purchase orders that may in turn be made. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all applicable Required Contract Provisions.

90.1 BREACHES AND DISPUTE RESOLUTION.

Contracts in excess of \$250,000. Any dispute arising under this Contract which is not disposed of by mutual agreement shall be resolved in accordance with 2 AAC 108.915.

90.2 TERMINATION.

Contracts in excess of \$10,000. This Contract may be terminated by either party upon 10 days written notice if the other party fails substantially to perform in accordance with its terms through no fault of the party initiating the termination ("Default Termination"). If the Authority terminates this agreement, the Authority will pay the Contractor a sum equal to the percentage of Work completed that can be substantiated either by the Contractor to the satisfaction of the Authority, or by the Authority. If the Authority becomes aware of any non-conformance with the Work or this agreement by the Contractor, the Authority will promptly notify the Contractor in writing of the non-conformance. Should the Contractor's Work remain in non-conformance after having received written notification, the percentage of total compensation attributable to the non-conforming Work may be withheld. The Authority may at any time suspend or terminate ("Convenience Termination") this Agreement for its needs or convenience with or without cause upon written notice. In the event of a Convenience Termination, the Contractor will be compensated for all authorized Work and authorized expenditures performed to the date of receipt of written notice of termination plus reasonable expenses. No fee or other compensation will be due for any incomplete portion of the Work.

90.3 EQUAL EMPLOYMENT OPPORTUNITY.

Except as otherwise provided under [41 CFR Part 60](#), all construction contracts must include, and all contractors and subcontractors must comply with, the equal opportunity clause provided under [41 CFR 60-1.4\(b\)](#), in accordance with Executive Order 11246, "Equal Employment Opportunity" ([30 FR 12319, 12935, 3 CFR Part, 1964-1965](#) Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at [41 CFR part 60](#), "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

90.4 DAVIS-BACON ACT, AS AMENDED ([40 U.S.C. 3141-3148](#)).

Construction contracts in excess of \$2,000 are required to comply with the Davis-Bacon Act ([40 U.S.C. 3141-3144](#), and [3146-3148](#)) as supplemented by Department of Labor regulations ([29 CFR Part 5](#), "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must

pay wages not less than once a week. **A copy of the current prevailing wage determination issued by the Department of Labor is included in this solicitation.** Contract and subcontract awards must be conditioned upon the acceptance of the wage determination. All suspected or reported violations must be reported to the Federal awarding agency.

90.5 COPELAND “ANTI-KICKBACK” ACT ([40 U.S.C. 3145](#))

Construction contracts in excess of \$2,000 are required to comply with the **Copeland “Anti-Kickback” Act** ([40 U.S.C. 3145](#)), as supplemented by Department of Labor regulations ([29 CFR Part 3](#), “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). Each contractor or subrecipient is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. All suspected or reported violations must be reported to the Federal awarding agency.

90.6 CONTRACT WORK HOURS/SAFETY STANDARDS ACT ([40 U.S.C. 3701-3708](#)).

Construction contracts in excess of \$100,000 that involve the employment of mechanics or laborers are required to comply with [40 U.S.C. 3702](#) and [3704](#), as supplemented by Department of Labor regulations ([29 CFR Part 5](#)). Under [40 U.S.C. 3702](#) of the Act, each contractor is required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of [40 U.S.C. 3704](#) are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

90.7 RIGHTS TO INVENTIONS MADE UNDER A CONTRACT OR AGREEMENT.

If the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of [37 CFR Part 401](#), “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

90.8 CLEAN AIR ACT ([42 U.S.C. 7401-7671Q.](#)) AND THE FEDERAL WATER POLLUTION CONTROL ACT ([33 U.S.C. 1251-1387](#)), AS AMENDED

Contracts in excess of \$150,000 are required to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act ([42 U.S.C. 7401-7671q](#)) and the Federal Water Pollution Control Act as amended ([33 U.S.C. 1251-1387](#)). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

90.9 DEBARMENT AND SUSPENSION (EXECUTIVE ORDERS 12549 & 12689)

A contract award **greater than or equal to \$25,000** (see [2 CFR 180.220](#)) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at [2 CFR 180](#) that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” **Contractors that**

apply or bid for an award exceeding \$25,000 must sign and submit the attached “Debarment” certification with their bid.

90.10 BYRD ANTI-LOBBYING AMENDMENT ([31 U.S.C. 1352](#))

Each contractor and subcontractor must certify that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by [31 U.S.C. 1352](#). Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Disclosures shall be forwarded from tier to tier up to the Authority. **Contractors that apply or bid for an award exceeding \$100,000 must sign and submit the attached “Lobbying” certification with their bid.**

90.11 PROCUREMENT OF RECOVERED MATERIALS.

A state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at [40 CFR part 247](#) that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, **where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000**; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

90.12 PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT.

Contractors and subcontractors are prohibited from entering into a contract (or extending or renewing a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in [Public Law 115-232](#), section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities). See [§ 200.216](#).

90.13 DOMESTIC PREFERENCES FOR PROCUREMENTS.

As appropriate and to the extent consistent with law, and to the greatest extent practicable, Contractor’s are required to provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all contracts and purchase orders for work or products under this award. See [§ 200.322](#).

The funding for this project is exempt from the Build America, Buy America Act and therefore this solicitation is NOT subject to Buy America Preferences for Infrastructure Projects, 2 CFR 184. The project funding is a combination of DOE 40101d Grid Resilience funding, as well as state, local and Denali Commission non-federal match. The DOE Grid Resilience funds are exempt from BABA preference requirements pursuant to DOE's 8/18/23 DOE Tribal General Applicability waiver which waives all BABA preference requirements. All non-federal match is also subject to the DOE Tribal General Applicability waiver.

DEBARMENT, SUSPENSION, INELIGIBILITY & VOLUNTARY EXCLUSION – 2 CFR 200.214; Executive Orders 12549 and 12689 [Applicable to all federally assisted contracts which exceed \$25,000]**Instructions for Certification:**

1. 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 contractor and lower tier participants knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the Authority may pursue available remedies, including suspension and/or debarment.
2. The prospective contractor and lower tier participants shall provide immediate written notice to the Authority if at any time the prospective contractor and lower tier participants learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
3. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "persons," "lower tier 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 Orders [12549](#) and 12689. You may contact the Authority for assistance in obtaining a copy of those regulations.
4. The prospective contractor and lower tier participants agrees by submitting this bid or 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 in writing by the Authority.
5. The prospective contractor and lower tier participants further agrees by submitting this bid or proposal that it will require the language of this certification be included in all subcontracts and all lower tier participants shall certify compliance with this requirement.
6. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it 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 Non-procurement List issued by U.S. General Service Administration.
7. Nothing contained in the foregoing shall be construed to require establishment of system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
8. Except for transactions authorized under Paragraph 5 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 all remedies available to the Federal Government, the Authority may pursue available remedies including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion Lower Tier Covered Transaction

- (1) The prospective contractor and lower tier participants certifies, by submission of this bid or 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) When the prospective contractor and lower tier participants is unable to certify to the statements in this certification, such prospective participant shall attach an explanation to this proposal.

The Contractor, _____ certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 2 CFR §180 apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official: _____

Name and Title of Contractor's Authorized Official: _____

Date: _____

CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING - 31 USC §1352

[Applicable to all federally assisted contracts and to all related subcontracts which exceed \$100,000]

A bidder must submit to the Authority the below certification with its bid response for any federally assisted contract that exceeds \$100,000. Bids that are not accompanied by a completed certification may be rejected as nonresponsive.

1. The undersigned Contractor certifies, 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. The undersigned also agrees 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.

3. 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 USC 1352 (as amended by the Lobbying Disclosure Act of 1995). 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.

The Contractor, _____ certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 USC 3801, *et seq.*, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official: _____

Name and Title of Contractor's Authorized Official: _____

Date: _____

End of Federal Assurances

SECTION 01 11 13
SUMMARY OF WORK

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Contract Method.
- B. Work by Others.
- C. Coordination.
- D. Work covered by Contract Documents.

1.2 RELATED REQUIREMENTS:

- A. Section 00 70 00 – General Conditions.
- B. Section 00 80 00 – Supplementary Conditions.
- C. Division 1
- D. Divisions 2 through 33

1.3 CONTRACT METHOD

- A. This Contract is lump sum as shown on the Section 00 32 00 – Bid Schedule. This work shall be measured and paid for in accordance with Section 00 70 00 – General Conditions, Article 13 – Payment to Contractors and Completion and Section 01 29 73 - Schedule of Values.

1.4 WORK BY OTHERS

- A. All work shall be included in this Contract except for tasks specifically indicated as being performed by others.

1.5 COORDINATION

- A. Coordinate Work to assure efficient and orderly sequence of installation.
- B. Prior to procurement, verify that characteristics of interrelated equipment are compatible.
- C. Coordinate space requirements and installation of components. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.

1.6 WORK COVERED BY CONTRACT DOCUMENTS

- A. The intent of the Contract is to provide for the construction and completion of every detail of work described in the Contract Documents. The Contractor shall furnish all labor, materials, supervision, equipment, tools, transportation, quality control, and supplies required to complete the work in accordance with the Contract Documents.
- B. The following general requirements apply to the Base Bid and to all Additive Alternates.
 - 1. The local utility provides prime power to the community. Work at the project site

shall be coordinated to minimize disruptions to the existing power system. All outages shall be scheduled in advance with the local utility.

2. Receive Owner Furnished Materials in accordance with Section 01 64 00.
 3. Furnish all other required equipment and materials.
 4. Mobilize all required materials, equipment, tools, supplies, etc. and all required personnel to the project site in Tuluksak, AK.
 5. Provide advance written notice to the Authority in accordance with Section 01 77 00 - Contract Closeout Procedures to schedule substantial completion inspection. Prior to declaring the project substantially complete: perform all required tests of mechanical and electrical systems; submit test reports to the Authority; flush and charge all piping systems; and perform all other tasks required to prepare project for commissioning. Document completion by filling out the Substantial Completion Inspection Checklist and submitting to the Authority. An example checklist for a similar prior power plant is included at the end of this section. A final project-specific checklist will be provided to the Contractor prior to the start of construction.
 6. Provide access for the Authority and the Engineer to the site. Provide on-site transportation, ladders, lifts, etc. for inspection and testing of the work.
 7. Correct all deficiencies noted in the Substantial Completion Inspection punchlist. Provide photographic documentation of corrections to the Authority.
 8. Upon substantial completion acceptance, support the Authority in testing and commissioning of all systems as indicated. An example checklist for step-by-step testing and commissioning of a similar prior power plant is included at the end of this section. A final project-specific checklist will be provided to the Contractor prior to the start of construction.
 9. Deliver all materials and equipment taken out of service as a result of demolition to the local storage area designated by the utility.
 10. Upon completion, remove all Contractor tools and equipment from the project site, thoroughly clean all work areas, remove all rubbish and debris, and dispose of all waste in accordance with the Contract Documents.
- C. Work under this Contract is defined under Base Bid and Additive Alternates as described in the paragraphs that follow.

1.7 BASE BID DESCRIPTION OF WORK

Provide all work on the Tuluksak Power System Upgrade project except for work specifically indicated on the Drawings as Additive Alternates. Work shall include but not be limited to:

- A. Connect emergency generator (e-gen) with new riser as indicated to provide temporary prime power to community during major construction. Schedule power outage in advance with the local utility.
- B. Provide temporary three phase power to existing power plant for testing systems and equipment prior to commissioning.

- C. Demolish existing power plant features and systems and clean building as indicated. Provide building materials and modify building structure and add supports and other features as indicated.
- D. Provide mechanical equipment, piping, electrical equipment, wiring, raceways, lighting, instrumentation, controls, and all other materials as required to provide a complete, fully functional power plant.
- E. Install and connect new Owner Furnished engine-generators.
- F. Make minor modifications and provide new connections to existing engine-generators.
- G. Furnish new components and modify existing switchgear.
- H. Provide new step up transformer bank.
- I. Furnish and install new Starlink system to provide internet service at power plant.
- J. Pressure test, flush, and charge all piping systems. Test all electrical and controls systems.
- K. Provide notice of Substantial Completion in accordance with Section 01 77 00 – Contract Closeout Procedures. Prior to Substantial Completion inspection the Contractor shall ensure that the Work is complete including but not limited to:
 - 1. All systems are complete and ready for functional testing.
 - 2. All required mechanical and electrical testing such as pressure, phase rotation, continuity, megger, etc. have been completed to the satisfaction of the Authority and the test results have been submitted in writing to the Authority.
 - 3. All station service circuits are powered and have been tested. All motors have been checked for rotation.
 - 4. All hydronic piping systems have been flushed with potable water and charged with glycol.
 - 5. All instrumentation has been calibrated.
 - 6. The intermediate fuel storage tank has adequate fuel. The day tank and used oil blender have been filled and tested.
 - 7. The Fabricator of the Owner Furnished engine-generator #4 has performed the required initial startup, test run, and inspection of the engine-generator installation.
 - 8. The Pre-Commissioning Substantial Completion Inspection Checklist has been filled out and submitted in writing to the Authority.
- L. Upon substantial completion acceptance, the Authority will functionally test and commission the system. The Contractor shall support the Authority during testing. Support shall include but not limited to:
 - 1. Provide a minimum 300kW portable load bank with all required cables and connectors connected to the switchgear feeder breaker and a 120VAC control power source.
 - 2. Provide technicians on site who are familiar with the mechanical and electrical

systems to assist with testing and to make corrections to any deficiencies found in the Work.

- M. Tasks performed by the Authority will include but not be limited to:
1. A complete functional test of the generation system including automatic and manual start/stop, paralleling, load sharing, and safety shut downs.
 2. Functional test of all associated systems including fuel, used oil blending, cooling, plant heat, and ventilation.
 3. Final verification of calibration of all mechanical and electrical instrumentation devices.
 4. Final adjustment and marking of oil level site gauges.
 5. Test of all data and communication systems to demonstrate proper operation of SCADA system including remote internet access.
 6. Demonstration of system functions and operations to local power plant operators.
 7. Note that a draft version of a typical power plant Testing and Commissioning checklist is also included at the end of this section.
- N. Upon completion of testing and commissioning the Contractor shall:
1. Shut down temporary emergency generator (e-gen). Disconnect and remove temporary feeder as indicated.
 2. Clean up the project site and all work areas.

1.8 ADDITIVE ALTERNATE #1 (FIRE ALARM) DESCRIPTION OF WORK

- A. Provide fire alarm equipment and all other materials as required to provide a complete, fully functional fire alarm system in the power plant.

1.9 ADDITIVE ALTERNATE #2 (FIRE SUPPRESSION) DESCRIPTION OF WORK

- A. Provide fire suppression equipment and all other materials as required to provide a complete, fully functional fire suppression system in the power plant.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

PROJECT SCHEDULE CRITICAL DATES

Pre-Bid Meeting	See 001150a Special Notice to Bidders	
Bid Opening	See 00 02 00 Invitation to Bid	
Owner Furnished Materials Available for Pickup		May 1, 2026
Substantial Completion		February 2, 2027
Final Completion		March 2, 2027

Note that completion dates apply to the Base Bid and all Additive Alternates.

SEE ATTACHED DRAFT SUBSTANTIAL COMPLETION INSPECTION CHECKLIST

SEE ATTACHED DRAFT TESTING & COMMISSIONING CHECKLIST

**TULUKSAK POWER PLANT
SUBSTANTIAL COMPLETION INSPECTION CHECKLIST**

Power Plant Site & Building Exterior	
Exterior Signs & Decals in Place	
Exterior Siding Infill Patches Complete and Acceptable	
Radiator Supports Complete, Tight, Level, Bolted Tight	
Radiator Canopies Complete and Acceptable	
Site Cleanup Complete	
Intermediate Tank & Associated Piping	
Fuel Piping Installation Complete	
Fuel Piping Supports Adequate	
WTP and PP Tanks Actuator Valves Installation Complete, Verify Operation	
Piping Pressure Test Reports Complete & Available	
Tank Decals Complete	
Pipe Coatings Complete and Acceptable	
Day Tank Vent Riser Piping & Support Complete, Painted, Cap in Place	
Exterior Wiring & Conduit	
Intermediate Tank Conduit & Wiring Installation Complete, Supports Adequate	
Radiator Power/Control Wiring Complete, Supports Adequate	
Underfloor Generator Power Wiring Complete, Supports Adequate	
Exterior Alarms Complete & Operational	
Internet Service Installed and Operational for Commissioning	
All Conduit Wall Penetrations Flashed and/or Sealed	
480V Feeder & Step Up Transformer Bank	
New Pole-Mount Step Up Transformer Bank Installation Complete	
Feeder Breaker Connected & Rotation Correct for Distribution	
Power Plant Building Interior	
Overhead Door Installation Complete, Verify Manual Operation	
Control Room Man Doors Swing & Hardware Correct, Frames Painted	
Control Room Exterior Man Door Hardware Correct	
New Ventilation & Exhaust Openings Complete & Trimmed Out	
Old Radiator & Air Intake Openings Infilled, FRP Interior & Metal Exterior	
Interior Signs, Decals & Fire Extinguishers in Place	

**TULUKSAK POWER PLANT
SUBSTANTIAL COMPLETION INSPECTION CHECKLIST**

Generators	Gen #1	Gen #2	Gen #3	Gen #4
Vibration Isolators Adjusted, Hgt Correct, 1/8" Min. Nut Clearance				
Engine Drip Pans, Spare Filters, Break In Oil, Etc. On Site				
Control Wiring J-Boxes Mounted Correctly				
Control Wires Labeled, Terminations Tight, No Wear Points				
Power Wires Phase Taped, Lugs Tight, Heat Shrink, Secure/No Wear				
Bushings Grounded on Main Power Wireway & Enclosures				
Liquid Tight Flex Ends Made Up Tight				
Gen End Power Wire Lugs Torqued & Paint Marked	n/a	n/a		
Gen End Power Wires Routed & Secured - No Wear Points				
Generators Grounded to Structure				
Exhaust Temp & Filter Switch Wiring Complete				
Aeroquip Hose & Wire Loom Installation - No Wear Points				
Coolant Hose Secure, No Sharp Ends, No Wear Pnts, Clamps Tgt				
Starter Battery Cables Color Code, Routing & Support, Lugs Tight				
Battery Charger Operation - Normal & Equalize				
No Leaks - Glycol, Fuel, & Oil				
Exhaust Pipe & Muffler Complete & Supported, U-Bolts Tight	n/a	n/a		
Exhaust Flange Bolts Torqued & Paint Marked	n/a	n/a		
Exhaust Flange Bolts Accessible for Re-Torque After First Run	n/a	n/a		
Exhaust Pipe Insulation Complete & Secure	n/a	n/a		
Exterior Exhaust Support Strut Racks Complete	n/a	n/a		
Exhaust Rain Cap Installed & Functioning	n/a	n/a		
Exhaust Pipe Insulation Complete & Secure	n/a	n/a		
Crank Vent Pipe & Hose Complete & Secure	n/a	n/a		
Oil Level Site Gauges & Level Switches Calibrated & Marked				
Switchgear Generator Sections	Gen #1	Gen #2	Gen #3	Gen #4
Power Wires Phase Taped, Bus Bar Lugs Torqued & Paint Marked				
Control Wires Labeled, Terminations Tight				
Verify 24VDC Engine Battery Power				
Exhaust Temperature RTD's Calibrated on EasyGens				
Switchgear Master & Feeder/VFD Sections				
Feeder Conductors Phase Taped, Bus Bar Lugs Torqued & Paint Marked				
Control Wires Labeled, Terminations Tight				
Turn Off AC Power and Verify 24VDC Engine Power				
Ground Bus Permanently Bonded to Structure				
Ground Bus TEMPORARILY Bonded to Neutral for Load Bank				
Load Bank Connected to Bus				
Pressure Transmitters (PTC & PTH) Calibrated on PLC				
Temperature Transmitters (TT's) Calibrated on PLC				
Heat Recovery Pump Flow & Temperature Calibrated on PLC				
Glycol Level Sensor (GLS) Calibrated on PLC				
Station Service & Control Wiring				
Conduit Supports Complete & Secure				
Conduit & Flex Compression Fittings Tight				
Blank Cover Plates Installed				
Instrument Cables Secured				

**TULUKSAK POWER PLANT
SUBSTANTIAL COMPLETION INSPECTION CHECKLIST**

Cat5e Cables in Separate Raceways	
Fire System Conductors in Separate Raceways - Red	
Grounding Bushings on Main Power Conduits, Plastic Bushings on All Other	
Panelboard Circuits Correct, Phase Colors Correct, Breakers Labeled	
Panelboard Energized With 3-Phase Power and All Circuits Tested	
All Ceiling Lights Replaced with LED's, Confirm Operation	
All Emergency Lights Replaced, Confirm Operation (turn off breakers)	
All New Devices Labeled With Circuit #	
All New Disconnects Labeled With Device Served	
Ventilation	
All Intake Duct Mods & Dampers Installation Complete, Flashed & Sealed	
Exhaust Hood Sheet Metal Covers Complete	
All Exhaust Fan/Damper Assemblies Repaced	
Exhaust Fan Thermostats Complete, Confirm Fan & Damper Operation	
Generator Cooling & Primary (Interior) Heat Recovery Piping	
Radiators Properly Aligned and Secured to Support Frames	
Radiator Piping Connections Complete For Testing	
Coolant Piping Wall Penetrations Flashed & Sealed	
Piping - Circuiting & Valves Correct	
Valves - All Valves Open & Close Fully Without Interference	
Glycol Coolant Butterfly Valves - High Performance Type	
Piping - Supports Complete & Secure	
Temporary Stainers Installed In Radiator Inlets & Amot Bypass	
Piping Pressure Test Reports Complete & Available	
Piping - All Weld and Solder Joints Visually Acceptable	
HR Solder Strainer Cap Removed & Anti-Siezed	
HX-1 Properly Aligned and Secured to Wall-Mounted Strut	
HX-1 Connections Properly Brazed & Visually Acceptable	
Cooling System Flushed, Charged, & Bled For Testing, No Leaks	
Coolant Piping Wall Penetrations Sealed	

**TULUKSAK POWER PLANT
SUBSTANTIAL COMPLETION INSPECTION CHECKLIST**

ET-1 Low Level Switch Installation Correct - Check Function	
ET-1 Level Sensor Installation Complete	
ET-1 Pressure Cap Installed & Coolant Suction Main Maintaining 8 PSI Min	
P-HR1A On/Off Operation, Flow Correct	
Expansion Tank In WTP On Line, Confirm 20 PSIG Pre-Charge	
P-HR1B Correct Orientation	
Interior Secondary HR Piping - Circuiting & Valves Correct	
Building Heat Piping Reconnected - Circuiting & Valves Correct	
UH-1(2) & P-UH1(2) Installations Correct, Thermostat Control	
Piping - Insulation Complete & Secure	
Piping - Color Coded Flow Arrows in Place	
Piping - Numbered Valve Tags in Place	
Piping - Small NO & NC Valve Tags In Place	
Digital Thermometers Calibrated	
Piping Pressure Test Reports Complete & Available	
Interior Fuel & Oil Piping	
Piping - Circuiting & Valves Correct	
Valves - All Valves Open & Close Fully Without Interference	
Piping - Supports Complete & Secure	
Gen3 & Gen4 Single Racors Complete, Height Adequate for Draining	
System Flooded With No Leaks - Pipe Fittings, Hose Ends, Valves	
Piping Pressure Test Reports Complete & Available	
Pipe Coatings Complete	
Piping - Color Coded Flow Arrows in Place	
Piping - Numbered Valve Tags in Place	
Piping - Small NO & NC Valve Tags In Place	
Day Tank & Blender	
New Day Tank & Panel Installation Complete	
Used Oil Hopper & Filter Bank Installation Complete	
Day Tank Float Switches All N.C. Verify Start, Stop, Low Alarm, & High Alarm	
Pump Rotations Correct	
Verify Pump P-UO1 Operation (Remove Hose & Witness Flow Into Container)	
Verify N.O. & N.C. Solenoid Operation	
Set Timers to 5 Sec & Verify, Then Set to Design Values	
Blender Hopper Low Float Switch N.O., Verify Enable, Disable	
Verify Filter #1 & #2 Differential Pressure Switch Settings At 7 PSI	
Verify Intermediate PP/WTP Tank Selector Switch Operation	
Day Tank Full of Fuel for Commissioning	
5 Gallons Diesel Fuel or Used Oil in Hopper for Commissioning	
Used Oil Filter Bank Filled With Fuel (Top Off Each Filter)	

**TULUKSAK POWER PLANT
SUBSTANTIAL COMPLETION INSPECTION CHECKLIST**

Fire Suppression System <i>(Note that this may need to be done after plant commissioning)</i>	
Agent Rack Installations Complete & Secure	
Tubing Support Complete & Secure	
Panel & Manual Pull Station Installation	
Detector Installation	
Alarm Horn Installation Complete - Interior & Exterior	
System Filled With Potable Water	
Full Nitrogen Bottle In Rack	
Full Spare Nitrogen Bottle On Site	
Fire Suppression System Field Certified	
On Site Training Performed	
Power Plant Substantial Completion Acceptance - Ready for Testing	
Engineer Signature, Printed Name, & Date	
Contractor Signature, Printed Name, & Date	
AEA Staff Signature, Printed Name, & Date	

TULUKSAK POWER PLANT TESTING & COMMISSIONING CHECKLIST

Step #1 Cooling System Flush		Date:	Start Time:	
<p><u>Status & Prep</u> - Community being powered by e-gen. Verify rotation of distribution system at e-gen matches switchgear. Verify temporary neutral to ground jumper is in place. Verify Demand Control temporarily set to values per table. Connect minimum 300kW load bank to feeder breaker. Initially Run Engines With No Load.</p> <p><u>Warm Up Engines & Check System</u> – Verify cooling system is filled with water and bled, temporary plate type strainers are installed in radiator inlets and return pipes, and all radiator and engine valves are open. Open HX-1 supply and return valves. Turn on pump P-HR1A. Close normally open valve on thermostatic valve TV-1 inlet (B port) and open normally closed TV-1 bypass valve. Start all engines in Test-Idle mode. Allow to warm up for at least 3 minutes and check for leaks, vibration, oil pressure, and oil level. Change all generators to Run-Rated mode.</p>				
Generators Running Individually	Gen #1	Gen #2	Gen #3	Gen #4
Runs Good at Idle				
Runs Good at Rated Speed				
<p><u>Heat Up & Circulate Coolant</u> - Close all generator breakers and synch to bus. Verify switchgear bus rotation. Verify station service power on. Set load bank to 50kW. Run until coolant manifold temp reaches 150°F minimum and verify that all engine thermostats have at least partially opened (suction hoses hot). Open feeder breaker, turn off all engines, and turn off all pumps.</p> <p><u>Drain Cooling System & Refill With Glycol</u> – Open the normally open valve on TV-1 inlet (C port) and immediately drain the engine cooling system water to avoid settling out suspended solids. Remove the plate strainers from the radiators and inlet piping, install new flange gaskets, and re-tighten flanges. Close all drain valves. Refill entire cooling system with 50/50 ethylene glycol mixture and bleed air in preparation for Step 2 of commissioning. Close TV-1 normally closed bypass valve.</p>				
Distribution Rotation (A-B-C?)		Switchgear Bus Rotation (A-B-C?)		
Step #2 Manual Operation & Functional Testing		Date:	Start Time:	
<p><u>Status</u> - Set load bank to 50kW.</p> <p><u>Functional Testing</u> – Verify proper operation of all engine/generator monitoring and controls. During each step below allow enough time for system to stabilize and to record the indicated data. Verify all pre-alarm and alarm setpoints and breaker trip settings in switchgear per attached Table. Perform Manual Operation black start procedure with all 4 generators (page 2 of Generation Operating Instructions). Operate all generators individually and in parallel against load bank. Manually open and close feeder breaker. While running, verify that data communication is working correctly for each generator. Check a couple of data points on Diagnostic Gauge (DG) at generator then verify same readings are displayed on the Easygen at switchgear, on the master section OIU, and on the laptop or desktop computer being used.</p>				
Generators Running Individually	Gen #1	Gen #2	Gen #3	Gen #4
Manual Black Start Successful (Y/N)				
Verify Gen Alarm Setpoints Per Table				
Verify Gen Breaker Trip Settings Per Table				
Verify Radiator VFD Set Points Per Table			R1	R2
Radiator Correct Rotation - Bypass Mode (Y/N) & VFD Mode (Y/N)			R1	R2
Engine Speed (RPM) & Gen Frequency (Hz)				
Volts / Amps (Phase A)				
Volts / Amps (Phase B)				
Volts / Amps (Phase C)				

**TULUKSAK POWER PLANT
TESTING & COMMISSIONING CHECKLIST**

Generators Running Individually	Gen #1	Gen #2	Gen #3	Gen #4
Oil Pressure (PSI)				
Filter Vacuum (in H2O)				
Coolant Temp - Max Observed (Deg F)				
Exhaust Temp - Max Observed (Deg F)				
Fuel Cons. (GPH) & Efficiency (kWH/Gal)				
Engine Screen Matches Engine DG (Y/N)	Master OIU & Desktop Matches Engine Screen (Y/N)			
Generators Running in Parallel - Increase load bank to 100kW.				
Gen #1, #2, #3 & #4 (kW each)				
Gen #3 w/ Gen #4 (kW each)	-----	-----		
Gen #3 w/ Gen #2 (kW each)	-----			-----
Gen #3 w/ Gen #1 (kW each)		-----		-----
Gen #2 w/ Gen #1 (kW each)			-----	-----
Load Sharing Between Engines Stable - No Hunting (Y/N)				
Step #2 Manual Operation, Continued - Overall Plant Systems				
Functional Testing – Allow system to get hot enough to verify operation of thermostatic valve and radiators. During each step below allow enough time for system to stabilize and to record the indicated data. After verifying cooling system operation, turn on heat recovery system and circulate to get up to 170F minimum. Verify all readings and calibration of temp sensors and thermometers. Verify day tank gauge. Observe at least one day tank fill. Verify Feeder Breaker and Demand Control settings per Tables.				
Radiators / Coolant / Ventilation / Heat Recovery				
Generation Bay Temperature (Deg F)				
Radiator Temp - Max Observed (Deg F)		R1		R2
Radiator VFD Frequency - Max Observed (Hz)		R1		R2
Radiator VFD Stable Control - Not Hunting (Y/N)		R1		R2
Coolant Return Temp - Max Observed (Deg F)	Coolant Level at End of Test (%)			
Themometers & Temp Sensors Calibrated (Y/N)				
Verify SCADA VFD page displays on master OIU and also displays same on the laptop or desktop. (Y/N)				
Heat Recovery System: Pressure (PSI)	Supply Temp (F)	Return Temp (F)		
Heat Recovery System: Flow (GPM)	Output BTU (100k)	BTU/Hour		
Pressure Across P-HR1A: Upstream (PSI)	Downstream (PSI)			
Pressure Across P-HR1B: Upstream (PSI)	Downstream (PSI)			
Verify SCADA HRS page displays on master OIU and also displays same on the laptop or desktop. (Y/N)				

**TULUKSAK POWER PLANT
TESTING & COMMISSIONING CHECKLIST**

Fuel System / Demand / Misc. SCADA
Verify readings on EVO fuel panel for day tank & hopper match readings on master OIU. (Y/N)
Verify SCADA Fuel page displays on master OIU and also displays same on the laptop or desktop. (Y/N)
Verify Demand Control Settings Per Table. (Y/N)
Verify SCADA Demand page displays on master OIU and also displays same on the laptop or desktop. (Y/N)
Verify Feeder Breaker Trip Settings Per Table. (Y/N)
Verify SCADA Bus page displays on master OIU and also displays same on the laptop or desktop. (Y/N)
<u>Verify Internet Communication</u> – Have a person at remote office log on to the SCADA system. Using phone or text obtain confirmation of connection and correct function. (Y/N)
Verify SCADA displays all pages with data active. (Y/N)
<u>Verify UPS Function</u> – Temporarily turn off switchgear control power circuit SS-24. Verify Server remains powered by UPS. (Y/N)
<u>Verify 24VDC Battery Function</u> – Temporarily turn off switchgear control power circuit SS-24. Turn off incoming 24VDC breaker in three gen sections at a time and verify control power remains on from one remaining gen section. (Y/N)
Gen #1 24VDC Power () Gen #2 24VDC Power () Gen #3 24VDC Power () Gen#4 24VDC Power ()

**TULUKSAK POWER PLANT
TESTING & COMMISSIONING CHECKLIST**

Step #3 Automatic Black Start & Demand Control Date: _____ Start Time: _____

Status - Set load bank set to 300kW.
 Functional Testing – Confirm Demand Control settings for Levels 1-4 per final table. For each load setpoint below allow enough time for system to stabilize and to record the indicated data. Run system through Automatic Operation black start procedure (page 1 of Generation Operating Instructions) with 300kW load (Level 4). Reduce load to step system down to Level 3. Reduce load to step system down to Level 2. Change the lead unit selection from Gen#2 to Gen#3 to test Lead function at Level 2. Reduce load to step system down to Level 1. Increase load to step system up to Level 2. Place Gen#3 in Manual mode to verify that Gen #2 starts and goes on line. Place Gen#2 back in Lead and Gen #3 back in Auto. Reduce load to 50kW.

Confirm Temporary Demand Control Settings per Table (Y/N): Load Bank Set to 300kW (Y/N):

Gen #3 Set to "Lead Unit" (Y/N): Automatic Black Start Successful (Y/N):

Load Setpt. No.	Set Load Bank (kW)	Demand Control Level	Read Total Bus Load (kW)	Set Lead Unit	Generator #1		Generator #2		Generator #3		Generator #4	
					Set Gen#1 Status	Read Gen#1 Load (kW)	Set Gen#2 Status	Read Gen#2 Load (kW)	Set Gen#3 Status	Read Gen#3 Load (kW)	Set Gen#3 Status	Read Gen#4 Load (kW)
1	300 kW	Level 4		Gen #2	Auto		Auto		Auto		Auto	
2	240 kW	Level 3		Gen #2	Auto		Auto		Auto		Auto	
3	160 kW	Level 2		Gen #2	Auto		Auto		Auto		Auto	
4	160 kW	Level 2		Gen #3	Auto		Auto		Auto		Auto	
5	110 kW	Level 1		Gen #3	Auto		Auto		Auto		Auto	
6	160 kW	Level 2		Gen #3	Man		Auto		Auto		Auto	
7	150 kW	Level 2		Gen #2	Auto		Auto		Auto		Auto	
8	50 kW	Level 1		Gen #2	Auto		Auto		Auto		Auto	

Step #4 Oil Change Procedure While In Automatic Operation
 Status - Load bank set to 50kW and Gen #2 set to Lead from Step #3.
 Functional Testing – Run system through Oil Change procedure for Gen #1 (page 2 of Generation Operating Instructions). Demonstrate how to reset Engine Service Hours but do not reset. Leave Gen #1 in Man mode and repeat procedure for Gen #2. Return all to Auto mode, turn load bank off, and shut module off.

Plant Running in Automatic Mode with Gen #3 Online as Lead Unit in Auto Mode (Y/N)

Load Setpt. No.	Set Load Bank (kW)	Demand Control Level	Read Total Bus Load	Lead Unit	Generator #1		Generator #2		Generator #3		Generator #3			
					Set Gen#1 Status	Read Gen#1 Load(k	Set Gen#2 Status	Read Gen#2 Load(k	Set Gen#3 Status	Read Gen#3 Load(k	Set Gen#3 Status	Read Gen#3 Load(k		
1	50kW	Level 1		Gen #2	Auto		Auto		Auto		Auto			
2					Demonstrate Gen #1 Oil Change Procedure Per Instructions Above									
2	50kW	Level 1		Gen #2	Man		Auto		Auto		Auto			
3					Demonstrate Gen #2 Oil Change Procedure Per Instructions Above									
3	50kW	Level 1		Gen #2	Man		Man		Auto		Auto			
4					Return System to Normal Auto Operation									
4	50kW	Level 1		Gen #2	Auto		Auto		Auto		Auto			

**TULUKSAK POWER PLANT
TESTING & COMMISSIONING CHECKLIST**

Step #5 Manual Black Start Procedure Test & Demonstration		Start Time:		
<p><u>Status</u> - Load bank set to 50kW and Gen #2 set to Lead from Step #4. <u>Manual Black Start</u> – Perform Manual Operation black start procedure with all 4 generators (page 2 of Generation Operating Instructions). Verify that all units proportionately share load. Take Gen #2, Gen#3 & Gen#4 off line and run on Gen #1 alone. Open feeder breaker, take Gen #1 off line and allow the engine to cool down and stop</p>				
Generators Running in Parrallel	Gen #1	Gen #2	Gen #3	Gen #4
Gen1, Gen2, Gen3 & Gen4 (kW each)				
Generator #1 Running Individually	Gen #1	Gen #2	Gen #3	Gen #4
Gen #1 (kW)		-----	-----	-----
Manual Black Start & Stop Successful (Y/N)		Generators Stable Sharing Load (Y/N)		
Step #6 Commission New Power Plant		Start Time:		
<p>Disconnect load bank and remove temporary neutral to ground jumper. Schedule a brief outage. Take E-Gen off line and remove temporary secondary feeder conductors. Reconnect permanent secondary feeder conductors from feeder breaker to transformer. Run new plant through Automatic Operation black start procedure and place in service. Observe Demand Control Operation. After system stabilizes in normal operation record Bus kW load, Bus metering data, and Station Service kW load.</p>				
Bus kW	Bus Voltage Phase A	Phase B	Phase C	
Station Service kW	Bus Current Phase A	Phase B	Phase C	
Steps #1-#6 Complete & Accepted		Time:	Date:	Outside Temp (F):
AEA Staff Signature, Printed Name, & Date				
Utility Staff Signature, Printed Name, & Date				

**TULUKSAK HEAT RECOVERY
TESTING AND COMMISSIONING CHECKLIST**

Heat Recovery System Commissioning	
<i>Note: Prior to filling system generators need to be on line carrying load to provide heat source.</i>	
Expansion Tank In WTP On Line, Confirm 20 PSIG Pre-Charge	
Fill Entire HR System With Propylene Glycol to 25 PSIG Cold	
Cycle All Pumps, Bleed/Purge Air at High Points & Unit Heaters All Buildings	
Run All Pumps Continuous, Add Propylene Glycol to Maintain 25 PSIG Cold	
Heat to 170F, Add Propylene Glycol to 30 PSIG Min, Circulate 24 Hours	
Stop Pumps, Clean Strainers at Power Plant & Water Treatment Plant	
Check Control Panel at Water Treatment Plant for Proper Operation	
Check Power Plant Unit Heaters - Cycle Pumps & Fans With T'Stat	
Verify Digital Thermometers Calibrated	
Verify HR System Flow, Temp, Pressure Readings on SCADA	
Top Off Glycol Makeup Tank at Water Treatment Plant with Propylene Glycol	
Heat Recovery System Substantial Completion Acceptance - Ready for Testing	
Contractor Signature, Printed Name, & Date	
AEA Staff Signature, Printed Name, & Date	

SECTION 01 12 19
CONTRACTOR'S CERTIFICATION OF SUBCONTRACTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 00 10 00 – Information to Bidders.
- B. Section 00 43 00 – Subcontractor List.
- C. Section 00 70 00 – General Conditions: Subcontractor Certification and Approval.
- D. Section 00 80 00 – Supplementary Conditions: Subcontract Provisions.
- E. Section 01 33 00 – Submittal Procedures.

1.3 PREPARATION OF CERTIFICATION

- A. Certification Forms: Use forms provided by the Authority.
- B. Contractor shall prepare certification form. Where required, attach additional information to the certification form.
- C. Substitute certification forms will not be considered.

1.4 SUBMITTAL OF CERTIFICATION

- A. The Contractor shall submit certification forms for all subcontractors for review and approval by the Authority.

1.5 CONSIDERATION OF CERTIFICATION

- A. Following receipt of submitted subcontractor certification forms, the Authority will review for the following, at minimum:
 - 1. Completeness of forms and attachments
 - 2. Proper execution (signatures) of forms and attachments
- B. Incomplete or improperly executed subcontractor certification forms will be returned to the Contractor for revision and resubmittal.
- C. Contractor shall remove its subcontractor from the project site until its subcontractor certification form is submitted, reviewed, and approved.
- D. The Authority will not process payments for work performed by a non-certified subcontractor.

1.6 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 Project Manager's signature.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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

PROJECT: Tuluksak Power Plant Upgrade Project PROJ. #: 26070

PRIME CONTRACTOR: _____

Pursuant to the Contract Documents, we hereby stipulate the following concerning the award of Work to the last Subcontractor on the following list:

1. First Tier Subcontractor: _____ DBE? Yes No
Second Tier: _____ DBE? Yes No
Third Tier: _____ DBE? Yes No
Fourth Tier: _____ DBE? Yes No
2. Date of Subcontract: _____
3. Amount of Subcontract: \$ _____
4. Scope of Work: _____

5. Are the following documents kept on file by both the Contractor and the Subcontractor (check the appropriate answer)?
Contract Minimum Wage Schedule Yes No
6. Does the Subcontract contain provisions for prompt payment, release of retainage, and interest on late payment and retainage conforming to AS 36.90.210? Yes No
7. Does the Subcontract specifically bind the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the Authority and does it contain waiver provisions and termination provisions as required by the Contract Documents? Yes No
8. a. Does the Subcontractor have adequate insurance coverages as specified in the Contract Documents? Yes No
If not, does the Contractor stipulate that the insurance limits of the Subcontractor are acceptable to the Contractor and that he has notified his insurance carrier of the reduced insurance limits? Yes No
b. Does the evidence of insurance certify that the policies described thereon comply with all aspects of the insurance requirements for this project? Yes No

Subcontractor Name: _____

c. Does the evidence of insurance list the Authority as an "Additional Insured" or "Certificate Holder"?

Yes No

d. Does the evidence of insurance commit to providing 30 day written notice of cancellation or reduction of any coverage?

Yes No

e. Insurance Expiration dates:

Comprehensive or Commercial General Liability: _____

Automobile: _____ Workers' Compensation: _____

(Other): _____

9. Copies of the following professional certifications, licenses, and registrations are attached (circle all that apply):

Business License (mandatory)

Contractor License (mandatory)

Land Surveyor's License

Electrical Administrator's License (mandatory for electrical subs)

Mechanical Administrator's License (mandatory for mechanical subs)

Engineer/Architect

Other: _____

10. Exceptions to any of the above are explained as follows: _____

CERTIFICATION (to be completed and signed by PRIME CONTRACTOR): I certify all the above to be true and correct.

Signature: _____

Printed Name: _____

Company: _____

Date: _____

AUTHORITY'S APPROVAL/DISAPPROVAL

The subject subcontract is **APPROVED**. Nothing in this approval should be construed as relieving the Prime Contractor of the responsibility for complete performance of the work or as a waiver of any right of the Approval to reject defective work.

Signature: _____ Date: _____
Project Manager

The subject subcontract is **NOT APPROVED** for the following reasons:

Signature: _____ Date: _____
Project Manager

SECTION 01 26 63
CHANGE PROCEDURES

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 00 32 00 – Bid Schedule.
- B. Section 00 51 00 – Construction Contract.
- C. Section 00 70 00 – General Conditions.
- D. Section 00 80 00 – Supplementary Conditions.
- E. Section 01 29 73 – Schedule of Values.
- F. Section 01 29 76 – Application for Payment.
- G. Section 01 32 16 – Construction Progress Schedule.
- H. Section 01 73 00 – Execution Requirements.

1.2 SUBMITTALS

- A. Submit the name of the individual authorized to accept changes, and to be responsible for informing others in the Contractor's employ of changes in the Work.
- B. Submit with each price proposal a complete, detailed, itemized cost breakdown defining all impacts on Contract Price and Contract Time, in sufficient detail to fully explain the basis for the proposal.
- C. All change forms shall be provided by the Authority.

1.3 CHANGE AUTHORIZATION

- A. In accordance with Section 00 70 00 – General Conditions, Article 9 Changes, the Authority may authorize changes to the Work. The Authority may authorize changes in one of the following ways:
 - 1. Directive (Section 00 70 00, Article 9.3).
 - 2. Change Order (CO) (Section 00 70 00, Article 9.4).
 - 3. Acceptance of Shop Drawing variations, which have been identified by the Contractor. (Section 00 70 00, Article 9.5).
 - 4. Interim Work Authorization (IWA) (Section 00 70 00, Article 9.10).

1.4 CHANGE PROCEDURES

- A. The Authority may initiate change to the contract by issuing to the Contractor a Request for Proposal (RFP) document. The RFP may include:
 - 1. Change narrative.
 - 2. Supplementary revised drawings, specifications, additional details, or sketches.

3. Other information as deemed appropriate.
- B. The Contractor shall request a change to the contract by submitting to the Authority a written Change Order Request form provided by the Authority. The Authority may respond by rejecting it, or with an RFP to initiate contract change. The Contractor's Change Order Request shall include, at minimum:
1. A description of the proposed change with a statement of the justification of the change.
 2. Statement of the effect of the change on Contract Price and Contract Time.
 3. The information required in Section 00 70 00 – General Conditions, Article 15 Claims and Disputes.
- C. Upon receipt of a Request for Proposal (RFP) from the Authority, the Contractor shall respond with a price proposal. The Contractor shall make every effort to return its price proposal in response to the RFP within the time frame requested by the Authority, but in no event later than 14 calendar days from date the RFP is issued. For work to be performed after the execution of a Change Order, the basis of pricing shall be estimated. For work performed prior to the execution of a Change Order, the pricing shall be based upon documentation of actual incurred costs. The price proposal shall include:
1. A complete, detailed, itemized price breakdown.
 2. For the prime contractor and subcontractors, detailed documentation of costs for direct costs, labor, equipment, consultants, sub-contractor markups, overhead and profit, and other items set forth in General Conditions Section 00 70 00, Article 10.
 3. Other information as required by the Authority.
- D. Upon receipt of pricing response to an RFP, the Authority may execute a change to the contract. The issuance of an RFP or the receipt of pricing response to an RFP shall not obligate the Authority to execute a change to the contract.

1.5 DIRECTIVES

- A. The Authority may issue Directives as per Section 00 70 00 – General Conditions, Article 9.3.

1.6 INTERIM WORK AUTHORIZATIONS (IWA)

- A. The Authority may issue Interim Work Authorizations in accordance with Section 00 70 00 – General Conditions, Article 9.10.

1.7 CHANGE ORDER

- A. Any change in Contract Time, Contract Price, or associated responsibility within the general scope of the Contract, shall be made by Change Order.
- B. The Contractor shall use forms furnished by the Authority for Change Orders.

1.8 CHANGE PRICING AND TIME ANALYSIS

- A. Unless specified elsewhere, Section 00 70 00 – General Conditions, Article 10 shall be applied to the negotiation of all changes to the scope of the contract.
 - 1. Unit Price, when unit prices are contained in the Contract.
 - 2. Mutually acceptable Lump Sum Price, including overhead and profit.
 - 3. Cost of the Work.
- B. UNIT PRICE CHANGE – For unit price CHANGE PROCEDURES, prices shall be determined by multiplying the contractual unit price(s) by the estimated quantities of Work associated with changed scope. Payment will be based on the actual installed quantities. Document actual installed quantities and submit information requested by the Authority on a daily basis for its approval and certification. Refer to Section 00 70 00 – General Conditions, Article 10 for additional requirements.
- C. LUMP SUM PRICE CHANGE – The Contractor and the Authority shall negotiate an equitable price (and time adjustment if appropriate) in good faith. If negotiations do not result in a mutually acceptable lump sum price, the Authority may, at its discretion, direct the Contractor to perform the work under Cost of the Work Change Order. Refer to Section 00 70 00 – General Conditions, Article 10 for additional requirements including maximum markup rates.
- D. COST OF THE WORK CHANGE – The Contractor shall document Cost of the Work on forms acceptable to the Authority, and shall submit documented costs to the Authority daily for verification and certification. Cost of the Work pricing proposals shall be supported by invoices for substantiation of purchase and rental costs and with additional data as may be requested by Authority. Refer to Section 00 70 00 – General Conditions, Article 10 for additional requirements. Refer to Section 00 80 00 – Supplementary Conditions, SC-10.6.2 for maximum markup rates.
- E. Time Analysis: NOT USED.
- F. The Authority shall have the right to audit all records in possession of the Contractor relating to activities covered by the Contractor’s pricing of Contract CHANGE ORDER PROCEDURES, including Cost of the Work pricing, as set forth in Section 00 70 00 – General Conditions. If the Contractor is a joint venture, the right of Authority shall apply collaterally to the same extent to the records of joint venture sponsor, and of each individual joint venture member.

1.9 FORM EXECUTION

- A. Contract forms issued under this section shall be effective the date the Authority’s authorized person signs the form.
- B. For Change Orders, Contractor signature will indicate acceptance of the terms or acknowledgment of order, depending on box checked. Acknowledgment of Change Order does not substitute for notification requirements of Section 00 70 00 – General Conditions, Article 15.1.

1.10 PAYMENT

- A. The Contractor shall promptly revise its Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item. For Change Orders, adjust the Contract Price as shown on the Change Order.
- B. The Contractor shall promptly revise and resubmit its progress schedules to reflect any change in Contract Time, including adjustments for other items of Work affected by the change.
- C. Payment for contract changes shall be made only following the execution of Change Orders and the inclusion of the Change Order by reference on the Application for Payment form.
- D. Payment shall not be made for Work authorized via Interim Work Authorization until such work is formalized in a Change Order.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION



REQUEST FOR INFORMATION or INTERPRETATION

Project: Tuluksak Power Plant Upgrade Project

R.F.I. Number: _____

From: _____

Date: _____

To: Alaska Energy Authority

A/E Project Number: _____

Contract For: _____

Re:

Specification Section:

Paragraph:

Drawing Reference:

Detail:

Request:

Signed by:

Date:

Response:

Attachments:

Response From:

To:

Date Rec'd:

Signed by:

Date:

Copies: Owner Consultants _____ _____ _____ _____ File



CHANGE ORDER REQUEST (PROPOSAL)

Project: Tuluksak Power Plant Upgrade Project

R.F.I. Number: _____

From: _____

Date: _____

To: Alaska Energy Authority

A/E Project Number: _____

Contract For: _____

Re: _____

This Change Order Request (C.O.R.) contains an itemized quotation for changes in the Contract Sum or Contract Time in response to proposed modifications to the Contract Documents based on Proposal Request No. _____.

Description of Proposed Change:

Attached supporting information from: Subcontractor Supplier _____ _____

Reason For Change:

Does Proposed Change involve a change in Contract Sum? No Yes [Increase] [Decrease] \$ _____
Does Proposed Change involve a change in Contract Time? No Yes [Increase] [Decrease] days. _____

Attached pages: Proposal Worksheet Summary: _____
 Proposal Worksheet Detail(s): _____

Signed by: _____ Date: _____

Copies: Owner Consultants _____ _____ _____ File

This page is blank intentionally.

Project No.: 26070

Directive No.: 000

Project Name: Tuluksak Power Plant Upgrade Project

Contractor: _____

Address: _____

Scope of this Directive

Commencement of Work

Suspension of Work

Contract Non-Conformance

Contract Clarification

Directive issued By: _____ Date: _____
Engineer or AEA Project Manager

Receipt Acknowledged By: _____ Date: _____
Contractor's Representative:

This Directive complements, and is used in accordance with the terms and provisions of the above referenced Contract, and shall not serve to authorize a change in Contractual responsibility. If the CONTRACTOR believes that any condition in this document may affect Contract Time, Price, or Requirement the CONTRACTOR shall immediately notify the DEPARTMENT of such condition. Contract Performance is required as follows:

DESCRIPTION

X

If the Contractor believes this Directive will adjust the Contract time or price the Contractor shall provide a Changer Order Request (COR) to the Authority, within 14 calendar days.

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for preparing and submitting the schedule of values.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 01 11 13 – Summary of Work.
- C. Section 01 26 63 – Change Procedures.
- D. Section 01 29 76 – Application for Payment.
- E. Section 01 32 16 – Construction Progress Schedule.
- F. Section 01 33 00 – Submittal Procedures.
- G. Section 01 77 00 – Contract Closeout Procedures.

1.3 FORMAT

- A. Form and content must be acceptable to the Authority.
- B. Form shall have a signature block for submission by Contractor and a signature block for approval by the Authority.
- C. Content shall include the following column headings.
 - 1. Pay Item Activity Number.
 - 2. Pay Item Activity Description.
 - 3. Pay Item Activity Dollar Value.
 - 4. Current Percent Complete.
 - 5. Current Dollar Complete.
 - 6. Previous Percent Complete.
 - 7. Previous Dollar Complete.
 - 8. Percent Complete this Period.
 - 9. Dollar Complete this Period.

1.4 CONTENT

- A. List installed value of each activity shown on the submitted and approved Construction Project Schedule.
- B. For items on which payments will be requested for stored products, list sub values for cost of stored products with taxes paid.

- C. Limits for specific line item values shall be as specified below and shall be included on all approved Schedules of Values and Applications for Payment.
1. Mobilization and Demobilization: NOT APPLICABLE
 2. Contract Closeout Procedures: Unless specified elsewhere, the assigned values for tasks specified under Contract Closeout Procedures shall be based upon the estimated value of each task. The breakdown shall include separate amounts for the requirements of Final Completion and Final Acceptance, as set forth below:

<u>Contract Price</u>	<u>Value for Final Completion</u>	<u>Value for Final Acceptance</u>
Less than \$200,000	\$2,000	\$2,000
\$200,000 - \$500,000	\$5,000	\$5,000
\$500,001 - \$1,000,000	\$10,000	\$10,000
\$1,000,001 - \$5,000,000	\$20,000	\$20,000
Greater than \$5,000,000	\$30,000	\$30,000

- D. The sum of values listed on the Schedule of Values shall equal total Contract Price.

1.5 A Schedule of Values containing costs for early activities in excess of actual value (“front end loading”) will be rejected by the Authority until the Contractor corrects the deficiency. The Authority shall not be obligated to pay the Contractor until front end loading is eliminated and the Schedule of Values is approved.

1.6 SUBMITTAL

- A. Submit proposed Schedule of Values with updated Construction Project Schedule per specification sections for Summary of Work, Construction Progress Schedule, and Submittals.
- B. Submit Schedule of Values with updated completion percentages sufficiently in advance of each Application for Payment to enable the Authority to resolve differences.

1.7 SUBSTANTIATING DATA

- A. When the Authority requires substantiating information, submit data justifying line item amounts in question.
- B. Provide one copy of data with cover letter for each copy of the Application for Payment. Show application number and date, and line item by number and description.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 76
APPLICATION FOR PAYMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 00 32 00 – Bid Schedule.
- B. Section 00 70 00 – General Conditions.
- C. Section 00 80 00 – Supplementary Conditions.
- D. Section 01 11 13 – Summary of Work.
- E. Section 01 26 63 – Change Procedures.
- F. Section 01 29 73 – Schedule of Values.
- G. Section 01 32 16 - Construction Progress Schedule
- H. Section 01 77 00 – Contract Closeout Procedures.

1.3 FORMAT

- A. Submit Application for Payment on form approved by the Authority.

1.4 PREPARATION OF APPLICATIONS

- A. Type required information on Application for Payment form acceptable to the Authority.
- B. Execute certification by original signature of authorized officer upon each copy of the Application for Payment.
- C. Show breakdown of costs for each item of the Work on accepted Schedule of Values as specified in Section 01 29 73 – Schedule of Values.
- D. 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.
- E. Submit Stored Materials Worksheet with every Application for Payment requesting payment for stored materials. Show only direct costs of materials and freight. Submit documentation in accordance with Section 00 70 00 – General Conditions, Article 13.5 Stored Materials and Equipment, for materials shown in column titled “New Material This Pay Request Period.”

1.5 SUBMITTAL PROCEDURES

- A. Submit two originals of each Application for Payment at one-month intervals, or as otherwise agreed upon. Each document shall bear original signature of authorized executive.

- B. Submit with Authority-approved transmittal letter bearing Authority's project number.

1.6 SUBSTANTIATING DATA

- A. When Authority requires substantiating information, submit all requested data justifying line item amounts in question.
- B. Provide one copy of data with cover letter for each copy of Application for Payment. Show Application for Payment number and date, and line item by number and description.

1.7 SUBMITTALS WITH APPLICATION FOR PAYMENT

- A. Submit the following for review sufficiently in advance of Application for Payment to allow detailed review by Authority and resolution of differences.
 - 1. Schedule of Values with updated percentages of completion as required by Section 01 29 73 – Schedule of Values.
- B. Submit the following with each Application for Payment.
 - 1. Updated construction schedule as required by Section 01 32 16 - Construction Progress Schedule.
 - 2. Updated Project Record Documents as required by Section 01 78 39 – Project Record Documents.
 - 3. Letter certifying that all Project Record Documents, including as-built drawings and submittals are current.

1.8 ADDITIONAL REQUIREMENTS FOR FIRST APPLICATION FOR PAYMENT

- A. The first Application for Payment will be processed after the Project Manager has received all of the following:
 - 1. Superintendent Data (Section 00 70 00 – General Conditions, Article 6.2).
 - 2. Progress Schedule (Section 00 70 00 – General Conditions, Paragraph 6.6.1, and Section 01 32 16 - Construction Progress Schedule).
 - 3. Schedule of Values (Section 00 70 00 – General Conditions, Paragraph 6.6.2, and Section 01 29 73 – Schedule of Values).
 - 4. Submittal Schedule (Section 00 70 00 – General Conditions, Paragraph 6.6.2).
 - 5. Safety Representative Designation (Section 00 70 00 – General Conditions, Article 6.18).
 - 6. Building Permits (Section 00 70 00 – General Conditions, Article 7.2).
 - 7. Name of Individual Authorized to Accept Changes (Section 01 26 63 – Change Procedures).
 - 8. Contractor Quality Control Plan (Section 01 45 00 – Quality Control).

9. Freeze Protection Plan (Section 01 51 00 – Construction Facilities).

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for various meetings during the construction project.

1.2 RELATED REQUIREMENTS

- A. Section 01 11 13 – Summary of Work.
- B. Section 01 32 16 - Construction Progress Schedule.
- C. Section 01 33 23 – Shop Drawings, Product Data, and Samples.
- D. Section 01 45 00 – Quality Control.
- E. Section 01 73 00 – Execution Requirements.

1.3 GENERAL REQUIREMENTS

- A. All project meetings will be conducted telephonically unless specifically arranged to be held in person.

1.4 PRECONSTRUCTION CONFERENCES

- A. The Authority will administer preconstruction conference for execution of Contract and exchange of preliminary submittals. Attendance by all key Contractor and Subcontractor personnel is required.
- B. The Authority will document the meeting and distribute minutes within 48-hours of adjournment. Minutes will be typed, reflecting date, list of attendees and in a format to facilitate correction of previous meeting minutes. Distribution will be to all attendees and those affected by discussions or decisions made at meeting.

1.5 PREINSTALLATION CONFERENCES

- A. When required in an individual Specification section, and as shown in the Contractor's quality control plan, or as directed by the Authority, convene a pre-installation conference prior to commencing Work for a specific item.
- B. Require attendance of entities directly affecting, or affected by, Work of the section.
- C. Review conditions of installation, preparation and installation procedures, and coordination with related Work.
- D. Record significant discussions and agreements and disagreements of each conference, and approved schedule. Distribute record of conference to all attendees within 24-hours of adjournment.

1.6 PROGRESS MEETINGS

- A. The Contractor shall attend Progress Meetings when scheduled by the Project Manager or requested by the Contractor. Progress Meetings will be held on a day and time which is mutually convenient to both the Authority and the Contractor.

These meetings shall be documented by the Contractor as well as the Project Manager.

- B. The minimum frequency will be typically one time per week during active construction.
- C. Progress Meeting shall be attended by all key Contractor personnel and, as appropriate, key Subcontractor personnel.
- D. The Contractor shall furnish copies of its updated schedule, per Section 01 32 16 - Construction Progress Schedule, to all attendees of the meeting. This schedule will be reviewed in detail during the meeting and will be used for the coordination of activities by others.
- E. Progress Meetings will be used to review status, schedule, safety, quality, critical items, and other key aspects of the Work.

1.7 SAFETY MEETING

- A. The Contractor shall conduct Safety Meetings as required by its project Safety Program. Safety Meetings shall be documented in the daily work report.
- B. The Contractor shall invite the Authority to attend Safety Meetings.

1.8 OTHER MEETINGS

- A. At various times throughout the duration of the Contract, the Contractor will be required to attend meetings as requested by the Authority. It is anticipated that such meetings will involve coordination with others, project schedule review, problem resolution, change order negotiations, and other topics of mutual importance.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 00 80 00 – Supplementary Conditions.
- C. Section 01 11 13 – Summary of Work.
- D. Section 01 26 63 – Change Procedures.
- E. Section 01 29 73 – Schedule of Values.
- F. Section 01 29 76 – Application for Payment.
- G. Section 01 31 19 – Project Meetings.
- H. Section 01 32 26 - Construction Progress Reporting.
- I. Section 01 33 00 – Submittal Procedures.

1.3 SUBMITTALS

- A. Within two (2) calendar weeks of the contract award the Contractor shall submit a preliminary schedule.
- B. Within one (1) calendar week of receipt of review comments from the Authority the Contractor shall submit a revised schedule.
- C. An updated schedule shall be submitted with each Application for Payment.

1.4 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: Maximum 22 x 17 inches.
- C. Scale and Spacing: To allow for notations and revisions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.2 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and

completion of each element of construction.

- B. Identify each item by Specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide legend for symbols and abbreviations used.

3.3 BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

3.4 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Project Manager at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.5 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Indicate changes required to maintain Date of Substantial Completion.

3.6 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Authority, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 32 26
CONSTRUCTION PROGRESS REPORTING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for submitting reports documenting construction progress.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 00 80 00 – Supplementary Conditions.
- C. Section 01 11 13 – Summary of Work.
- D. Section 01 31 19 – Project Meetings.
- E. Section 01 32 16 - Construction Progress Schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SCHEDULE

- A. A daily work report shall be prepared and submitted by the site Superintendent recording progress, all pertinent daily events, and status of any ongoing issues.
- B. Reports shall be submitted a minimum of one time per week. All daily reports for the week shall be consolidated and submitted no later than noon on the following Monday.
- C. More frequent submission may be required during critical times with multiple time critical tasks.
- D. Daily reports documenting work that will be concealed shall be submitted prior to covering work. Types of work requiring immediate reporting shall include but not be limited to underground installation, work that will be enclosed within building walls, floors, or roofs, and coating systems requiring multiple coats.
- E. Daily reports documenting mandatory tests shall be submitted within 24 hours of test completion. Types of work requiring immediate reporting shall include but not be limited to piping pressure tests and electrical circuit tests.

3.2 CONTENT

Daily reports shall include the following as appropriate:

- A. Summary of general tasks relative to construction progress.
- B. Weather conditions.
- C. A minimum of 4 project photos of the work performed that day unless no new work was performed.
- D. Additional photos shall be submitted as required to document work that will be

- covered or to document mandatory tests.
- E. Additional photos shall be submitted if problematic site conditions are encountered that may result in delays or change of conditions.
 - F. Names and titles of all laborers onsite (daily basis).
 - G. Regular labor hours worked (daily basis).
 - H. Overtime hours worked (as encountered and cumulative).
 - I. Material quantities delivered (daily and cumulative).
 - J. General material management items (daily and cumulative).
 - K. Unsuitable quantities hauled offsite (daily and cumulative).
 - L. Quantities of pay items installed (daily and cumulative).
 - M. Any construction issues resulting in delays (reported day of, as encountered).
 - N. Any equipment issues causing delays (reported day of, as encountered).
 - O. Safety Meetings, topics covered.
 - P. Safety issues and concerns (reported day of, as encountered).
 - Q. Disputes (reported day of, as encountered).
 - R. Any information required or outstanding from the Authority.
 - S. Items that could require a change order (reported day of, as encountered).
 - T. Requests for information (reported day of, as encountered).
 - U. Site characteristics that may warrant a Change In Conditions (reported day of, as encountered).
 - V. Note of any onsite conversation, or communication, where direction is given to the contractor which could incur an added cost owed to the Contractor. Date, Time and name of individual must be reported (reported day of, as encountered).

3.3 DISTRIBUTION OF REPORTS

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Authority, and other concerned parties.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Procedures for the preparation, tracking, and review of submittals for the project.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Requirements.
- B. Section 00 80 00 – Supplementary Conditions.
- C. Section 01 11 13 – Summary of Work.
- D. Section 01 12 19 – Contractor’s Certification of Subcontracts.
- E. Section 01 29 73 – Schedule of Values.
- F. Section 01 29 76 – Application for Payment.
- G. Section 01 32 16 - Construction Progress Schedule.
- H. Section 01 33 23 – Shop Drawings, Product Data, and Samples.
- I. Section 01 45 00 – Quality Control.
- J. Section 01 60 00 – Material and Equipment.
- K. Section 01 73 00 – Execution Requirements.
- L. Section 01 77 00 – Contract Closeout Procedures.
- M. Technical Specifications.
- N. Operations and Maintenance Manuals.
- O. Equipment Installation Data.

1.3 SUBMITTAL TIMELINE

- A. The Preliminary Submittal Register shall be provided to the Authority within two (2) calendar weeks of the contract award.
- B. All Submittals shall be provided to the Authority within six (6) calendar weeks of the contract award.
- C. If Submittals for specific items cannot be provided with 6 weeks the Contractor shall notify the Authority in writing listing the specific item(s) and the proposed date for delivery.

1.4 SUBMITTAL REGISTER

- A. Submit preliminary Submittal Register as required by Section 00 70 00 – General Conditions. In addition to manufacturer’s data and shop drawing submissions, include all submittals required by the Contract Documents in the Submittal Register

- B. Submittal Register shall portray an orderly sequence of submittals, early submittals for long lead-time items, and submittals which require extensive review.
- C. Submittal Register shall be reviewed by the Authority and shall be revised and resubmitted until accepted by the Authority.

1.5 SUBMITTAL PREPARATION

- A. The Contractor shall prepare all submittals as required by the provisions of Section 00 70 00 – General Conditions, Section 00 80 00 – Supplementary Conditions, the technical specifications, and the drawings.
- B. The Contractor shall review submittals for accuracy and completeness prior to submitting.

1.6 SUBMITTAL REQUIREMENTS

- A. Unless otherwise directed in these documents or by Authority, provide each submittal as an electronic portable document format (PDF) file, transmitted via email. If file is too large to be received by Authority via email, provide a download link, deliver in portable USB drive, or as otherwise instructed by Authority.
- B. Submit each submittal with a Submittal Summary form as its face document. Use a Submittal Summary form provided by the Authority, or a substitute approved by the Authority.
- C. Label submittals with a numbering system approved by the Authority. Identify the project by title and Authority's project number; identify Work and product by Specification section and Article number.
- D. Submit items required by individual Specification sections together. Do not mix items specified in different sections in the same submittal. Sequence the submission of submittals to correspond with the approved Submittal Register.
- E. Before the submission of each submittal, 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 submittal with other submittals and with the requirements of the Work and the Contract Documents, upon which the Contractor shall certify in writing on each submittal that it has made this determination. The failure to review and certify a submittal shall be cause for the Authority to return the submittal without review.
- F. On the submittal, notify the Authority in writing of any deviations from requirements of the Contract Documents.
- G. Organize the submittals into logical groupings to facilitate the processing of related submittals, such as:
 - 1. By Specification Section number. Sequentially number each submittal. Resubmittals shall be identified with the original submittal number followed by a sequential alphabetic suffix.

2. Finishes which involve Authority selection of colors, textures, or patterns.
 3. Items required by the individual Technical Product Specification Sections.
 4. Associated items, which require correlation for efficient function or for installation.
- H. Submit all required color and finish samples in order to receive approval for colors and finishes.

1.7 RESUBMITTALS

- A. Provide complete copies of re-submittals. Do not re-submit partial copies of submittals for incorporation into the Authority's retained submittals from the prior submission.
- B. If drawings, product submittals, samples, mockups, or other required submittals are incomplete or not properly submitted, the Authority will not review the submittal and will return it to the Contractor. The Authority will review a submittal no more than 2 times without additional charge to the Contractor. The Contractor shall pay all review costs associated with more than 2 reviews.

1.8 AUTHORITY REVIEW

- A. The Authority will review submittals and re-submittals, and return submittal comments within 7 calendar days of receipt.
- B. The Authority or authorized agent will receive, review and return submittals to the Contractor with one of the following dispositions noted:
 - “Approved” – denotes that the submittal is generally consistent with the requirements of the Contract Documents. A resubmittal is not required.
 - “Approved with Corrections Noted” – denotes that the submittal is generally consistent with the requirements of the Contract Documents but only as conditioned by notes and corrections made on the submittal. A resubmittal is not required provided the Contractor understands the review comments and desires no further clarification.
 - “Revise and Resubmit” – denotes that revisions are required in the submittal in order for the submittal to be generally consistent with the requirements of the Contract Documents. The Authority will indicate on the returned submittal what revisions are necessary. A resubmittal is required.
 - “Rejected” – denotes that the submittal does not meet the requirements of the Contract Documents and shall not be used in the Work. The Authority will indicate on the returned submittal the reasons for its rejection. A resubmittal is required.
- C. Review by the Authority of submittals shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is consistent with the requirements of the Contract Documents. Review of submittals shall not relieve the Contractor of the responsibility for compliance

with the requirements of the Contract Documents or for errors, dimensions, and quantities unless specific exception is requested and approved on the submittal.

- D. The Authority's review shall not extend to the means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

1.9 DISTRIBUTION

- A. The Contractor shall be responsible for making and distributing any reproductions of approved submittals that it may require for its use.
- B. The Contractor shall perform work in accordance with approved submittals.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 01 11 13 – Summary of Work.
- C. Section 01 31 19 – Project Meetings.
- D. Section 01 33 00 – Submittal Procedures.
- E. Section 01 45 00 – Quality Control.
- F. Section 01 60 00 – Material and Equipment.
- G. Section 01 73 00 – Execution Requirements.
- H. Section 01 78 39 – Project Record Documents.
- I. Technical Specifications: Identification of submittal requirements.

1.2 SHOP DRAWINGS

- A. Present in a clear and thorough manner. Label each Shop Drawing with Authority's Project name, Project number and date of submittal. Identify each element of the Shop Drawings by reference to specification section, sheet number and detail, schedule, or Area of Work.
- B. The data shown on the Shop Drawings shall be complete with respect to specified performance and design criteria, materials and similar data to show the Authority materials and equipment the Contractor proposes to provide.
- C. Identify dimensions; show relation to adjacent or critical features or Work or products.
- D. Designation of work “by others”, if shown in submittals, shall mean that work will be responsibility of Contractor rather than subcontractor or supplier who has prepared submittals.
- E. Minimum Sheet Size: 11"x17".

1.3 PRODUCT DATA

- A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification section and Article number. Show reference standards, performance characteristics and capacities; wiring, piping and control diagrams; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.
- C. Submit manufacturer's instructions for storage, preparation, assembly, installation, start-up, adjusting, commissioning, and finishing.

1.4 SAMPLES

- A. Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures and patterns for Authority selection as specified in technical product sections.
- B. Submit samples to illustrate functional characteristics of products, including parts and attachments.
- C. Approved samples which may be used in the Work are indicated in the Specification section.
- D. Samples shall be identified clearly as to material, supplier, pertinent data such as catalog numbers and the use for which they are intended, and otherwise as the Authority may require, to enable the Authority to review the submittal.
- E. Label each sample with identification required for transmittal letter.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 – GENERAL

1.1 RELATED SECTION

- A. Section 00 70 00 – General Conditions.

1.2 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or other technical standards: comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of bid advertisement, unless otherwise stated in the Contract Documents.
- C. Provide copies of standards through the submittal process when required by the Contract Documents. Maintain a copy of each reference standard on site during construction.
- D. Should specified reference standards conflict with Contract Documents, request clarification from the Authority before proceeding. Local code requirements, where more stringent than referenced standards, shall govern.
- E. Neither the contractual relationship, duties, and responsibilities of the parties to the Contract, nor those of the Engineer, shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.3 CODES, STANDARDS, AND REGULATORY REQUIREMENTS

- A. All work shall be in accordance with the latest edition of governing Codes, Standards and regulatory requirements, including but are not limited to:
 - 1. International Fire Code (IFC).
 - 2. International Building Code (IBC).
 - 3. National Fire Protection Association (NFPA) NFPA 30 and NFPA 37.
 - 4. National Electrical Code (NEC).
 - 5. National Electrical Safety Code (NESC)
 - 6. Alaska Department of Commerce, Community and Economic Development (DCCED) 12 AAC 32
 - 7. Alaska Department of Commerce, Community and Economic Development (DCCED) 12 AAC 39
 - 8. Alaska Department of Environmental Conservation (ADEC) 18 AAC 75.
 - 9. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME).

10. American Petroleum Institute (API).
11. American Society of Testing and Materials (ASTM).
12. American Society of Mechanical Engineers (ASME).
13. American Welding Society (AWS).
14. American Institute of Steel Construction (AISC).
15. Manufacturers Standardization Society of the Valve and Fitting Industry (MSS).
16. Steel Structures Painting Council (SSPC).
17. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 43 10
CONTRACTOR QUALIFICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Contractor's technical qualifications to be able to execute the Work in accordance with the Contract Documents.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 01 33 00 – Submittal Procedures.
- C. Section 01 45 00 - Quality Control.
- D. Technical Specifications: Contractor and Fabricator Qualifications.

1.3 SUBMITTALS

- A. As part of the Submittal process submit evidence of qualifications as required by this section and the Technical Specifications.
- B. The subcontractor list shall designate the party responsible for the portion of Work requiring specific qualifications.

1.4 CONTRACTOR QUALIFICATIONS - GENERAL REQUIREMENTS

- A. The Contractor shall meet all technical requirements of the Contract Documents. The Contractor may use sub-contractors as required to meet the requirements. The Authority may request documentation of all required qualifications after the bid opening and prior to award in order to verify Contractor qualifications.

1.5 CONTRACTOR QUALIFICATIONS - SPECIFIC REQUIREMENTS

- A. In accordance with Alaska statues and regulations, all Electrical work falling under the scope of 12 AAC 32.075 shall be performed under the supervision of an Electrical Administrator with a current license in the State of Alaska in the Unlimited Linework Category.
- B. In accordance with Alaska statues and regulations, all Electrical work falling under the scope of 12 AAC 32.165 shall be performed under the supervision of an Electrical Administrator with a current license in the State of Alaska in the Unlimited Commercial Wiring Category.
- C. In accordance with Alaska statues and regulations, all Mechanical work falling under the scope of 12 AAC 39.212 shall be performed under the supervision of a Mechanical Administrator with a current license in the State of Alaska in the Unlimited Commercial and Industrial Plumbing Category.
- D. The technical specifications require certain work to be performed by experienced workers with special qualifications such as Journeyman Electricians and Certified Pipe Welders. All work shall be performed by qualified personnel in accordance with the technical specifications.

- E. The technical specifications require additional qualifications for design, fabrication, and installation of specialty systems including fire suppression, switchgear, and SCADA. Sub-contractors shall meet the minimum requirements of the technical specifications for their specialty system.
- F. Initial startup and running of the new Owner Furnished engine-generator #4 must be performed by the Fabricator that provided the engine-generator, 49th State Power. The Contractor shall hire 49th State Power or an authorized representative to perform initial startup, test run, and final inspection of new Generator #4 as required to ensure full warranty coverage. Contractor personnel shall not operate the engine-generators until they have been approved by the Fabricator.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Contractor's quality assurance program and control procedures for executing the Work.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 01 33 00 – Submittal Procedures.
- C. Section 01 33 23 – Shop Drawings, Product Data, and Samples.
- D. Section 01 42 19 – Reference Standards.
- E. Section 01 43 10 - Contractor Qualifications.
- F. Section 01 60 00 – Material and Equipment.
- G. Technical Specifications: Testing and Reporting requirements.

1.3 TEST FORMS

- A. The Contractor shall provide forms for all test required by the Technical Specifications. Tests forms shall include but not be limited to tank and piping pressure test, phase rotation, continuity and insulation, etc.
- B. Upon request the Authority can provide the Contractor forms for common tests.

1.4 GENERAL

- A. The Contractor shall provide and maintain an effective Quality Control Program related to testing and inspection. The Contractor shall perform Quality Control Testing as specified and shall provide copies of all results to the Authority for use in observing contract compliance.
- B. The Contractor's Quality Control Program shall include, but is not limited to: administration, management, supervision, reports, record-keeping, submittals, services of independent testing agencies and labs, and other related services.
- C. Quality Control is the sole responsibility of the Contractor.
- D. Specific Quality Control requirements are included in the Technical Specifications. General Quality Control requirements entail ensuring that all aspects of the Work conform to the technical requirements of the Contract Documents.
- E. The Contractor's Quality Control Program described herein is not intended to limit the Contractor's Quality Control activities, which may be necessary to achieve compliance with the Contract Documents.

1.5 JOB CONDITIONS

- A. Where Specifications require work to be field-tested, timely notice of its readiness for inspection and testing shall be provided to the Authority. The Authority shall have the right to witness all tests. Photos shall be taken to document all tests. Work shall be concealed only upon approval by the Authority.
- B. The results of tests are for use by the Authority to evaluate the acceptability of Work with respect to specified testing requirements. Regardless of the test results, Contractor is solely responsible for quality of workmanship and materials and for compliance with requirements of Contract Documents.
- C. Maintain quality control over sub-contractors, suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality. Verify applicability and follow all manufacturers' recommendations and instructions for assembly, installation and testing of materials and equipment. In any case where the Contractor believes that such recommendations or instructions are not applicable, the Contractor shall so notify the Authority and state the reasons for the Contractor's determination. The Contractor shall then follow the Authority's written direction on whether to follow manufacturer's recommendations and instructions.
- D. Upon failure of Work which has been tested or inspected, previous acceptance may be withdrawn and Work be subject to removal and replacement with Work in accordance with the Contract Documents, at no cost to the Authority.

1.6 MANUFACTURER'S FIELD SERVICES

- A. Required when technical specifications require the manufacturer or fabricator to provide qualified personnel to observe field conditions, installation, quality of workmanship, and to start, test, and adjust equipment as applicable.
- B. Submit to the Authority the manufacturer or fabricator representative's written reports containing observations and recommendations within one (1) calendar week of manufacturer's field services.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall provide full and complete documentation of Quality Control procedures and activities.

3.2 QUALITY CONTROL

- A. The Contractor shall establish the methodology to perform the Contractor's inspection and tests of all items including that of its subcontractors. The Contractor shall ensure conformance to applicable technical specifications and drawings with respect to the materials, Codes, workmanship, storage, installation, construction, finishes, functional performance, and identification. The Contractor shall ensure quality for all construction work performed under this Contract,

including assigned subcontract work. The Contractor shall specifically include surveillance and tests required in the technical specifications.

- B. The Contractor shall coordinate all work requiring Special Inspection, where specified, to ensure full access by Special Inspectors and Quality Assurance testing personnel.
- C. The Contractor shall provide, as a minimum, the following components for all definable features of work:
 - 1. Preparatory Inspection Meeting: Contractor shall schedule and attend a preparatory meeting to review testing procedures a minimum of a week prior to beginning work on any element of Work which has been identified in the Contract Documents to require testing and inspection by the Contractor and Code-required Special Inspection. Subsequent meetings shall be conducted as necessary to ensure continued accuracy of testing and inspection procedures.
 - 2. Document Control: Contractor shall have and follow a procedure for ensuring that all Work is performed in accordance with the following:
 - a. Conformed sets of Contract Drawings and Specifications.
 - b. Contract Change Order documents.
 - c. Approved Submittals.
 - d. Applicable Requests for Information (RFI's) or Design Clarification Verifications (DCVR's).
 - e. Manufacturer's Instruction.
 - 3. In Progress Inspection: Contractor shall perform in-progress inspections as work progresses on the Work which shall include, but not be limited to:
 - a. Examination of the quality of workmanship with respect to Contract Drawings, Technical Specifications and Approved Submittals.
 - b. Review of control testing for compliance with Contract requirements.
 - c. Inspection for use of defective or damaged materials, omissions and dimensional requirements.
 - d. Review of timeliness and scheduling requirements for all tests, retests and eventual approvals.
 - 4. Non-Conformance Procedure: Contractor shall have and follow a procedure for identifying, documenting, tracking, and resolving items in the Work which do not comply with Contract Documents, Specifications, Approved Submittals, or Manufacturer's Instructions. If a quality control test indicates that the tested material does not conform to the requirements of the Contract Documents, the Contractor shall take supplemental tests at the same location from which the non-conforming result was obtained,

after correction of the work, to document conformance with the Contract Documents. Otherwise, the Authority reserves the right to reject materials for which final Quality Control tests indicate non-conformance with the Contract Documents.

5. Code Required Inspection: Contractor shall coordinate and make timely requests for inspections, tests and other activities required by Codes and Regulations as specified.

3.3 RECORD KEEPING

- A. The Contractor shall maintain current Quality Control records, on forms acceptable to the Authority, of all inspections and tests performed. The records shall include factual evidence that the required inspections or tests have been performed, including, but not limited to, the following information for each such test and inspection: Specification reference, date, type and number of inspections or test involved; results of the inspections, tests or retests; the nature of defect, causes for rejection, proposed remedial action, corrective action(s) taken, and similar information related to any re-inspection.
- B. The Contractor shall maintain the following Quality Control records and reports and shall submit to the Authority as required:
 1. The Contractor shall fill out test reports immediately upon completion of each test. Test reports shall be signed and dated and shall include adequate photographs to document test procedure and conditions. Test reports shall be submitted with the daily report for the day of testing.
 2. Inspection Logs: The Contractor shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. The Inspection Log shall include compliance with shop drawings submittals, identification by Specification section and schedule activity of inspections, tests, and retests conducted, results of inspections and tests, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The Inspection Log shall be available for review by the Authority upon request.
 3. Immediate Notification of Deficiencies: Contractor shall provide immediate notification to the Authority whenever a failed or nonconforming test or inspection occurs. This immediate notification shall be followed up with a written report describing the deficiency and a correction plan.

3.4 ORGANIZATION

- A. Staffing Levels: Provide sufficient qualified personnel to monitor the work quality at all times. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity.
 1. In cases where multiple trades, disciplines or subcontractors are on site at the same time, each activity shall be inspected and tested by personnel skilled in that portion of the work.

2. In cases where multiple shifts are employed, the Quality Control staff shall be increased as required to monitor the work on each shift.

3.5 QUALITY SURVEILLANCE BY THE AUTHORITY

- A. All items of materials and equipment shall be subject to surveillance testing and inspection by the Authority at the point of production, manufacture or shipment to determine if the producer, manufacturer or shipper maintains an adequate inspection system which ensures conformance to the applicable specifications and drawings with respect to materials, workmanship, construction, finish, functional performance and identification. In addition, all items or materials, equipment and work in place shall be subject to surveillance testing and inspection by the Authority at the site for the same purposes. Surveillance by the Authority does not relieve the Contractor of performing Quality Control inspections and testing of either onsite or offsite Contractor's or subcontractor's workplace or manufacturing assembly plant.

END OF SECTION

SECTION 01 51 00
CONSTRUCTION FACILITIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for furnishing and maintaining construction facilities during the project.

1.2 RELATED REQUIREMENTS

- A. Section 01 11 13 – Summary of Work.
- B. Section 01 29 76 – Application for Payment.
- C. Section 01 73 00 – Execution Requirements.

1.3 TEMPORARY ELECTRICITY

- A. Provide and pay for temporary electrical service including required equipment.
- B. Provide lighting for construction operations.
- C. Provide additional lighting for inspections if requested by Authority or Engineer.

1.4 TEMPORARY HEAT

- A. Provide and pay for heat devices, insulated enclosure, tenting, and heat as required to maintain specified conditions for construction operations; for freeze protection; and to protect equipment, materials, and finishes from damage due to temperature or humidity.

1.5 TEMPORARY VENTILATION

- A. Provide and pay for ventilation of enclosed areas to cure materials, to disperse humidity, to prevent accumulations of dust, fumes, vapors, or gases, and to maintain a safe work environment.

1.6 TEMPORARY WATER SERVICE

- A. Provide and pay for temporary water service as required.

1.7 TEMPORARY SANITARY FACILITIES

- A. Provide and pay for required sanitary facilities and enclosures.

1.8 TEMPORARY TELEPHONE AND INTERNET SERVICE

- A. Provide and pay for telephone and internet service to the project site and/or Contractor field offices. Note that in addition to Contractor's needs there may be additional telephone and internet service requirements for testing, commissioning, and operation of the power plant. See Section 01 11 13 Summary of Work.

1.9 FREEZE PROTECTION

- A. Provide freeze protection for batteries, switchgear, control panels, and other components potentially subject to harm.

1.10 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where required and where Work is installed in unsecure areas.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

1.11 SECURITY

- A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

1.12 REMOVAL OF UTILITIES AND FACILITIES

- A. Unless required for testing, remove Temporary Construction Facilities, Services, Utilities, and other related items prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of Temporary Construction Facilities.
- C. Restore permanent facilities used during construction to a 'like new' condition if it was provided by Contract, or the condition the facility was found prior to construction of this project for existing facilities.

1.13 COST RESPONSIBILITY

- A. Unless specifically noted otherwise, the cost of Temporary Construction Facilities and utilities shall be the responsibility of Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 60 00
MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for transportation and handling, storage and protection, substitutions, and product options.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 01 11 13 – Summary of Work.
- C. Section 01 33 00 – Submittal Procedures.
- D. Section 01 33 23 – Shop Drawings, Product Data, and Samples.
- E. Section 01 42 19 – Reference Standards.
- F. Section 01 45 00 – Quality Control.
- G. Section 01 51 00 – Construction Facilities.
- H. Section 01 73 00 – Execution Requirements.

1.3 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. Immediately on delivery, inspect shipment to assure:
 - 1. Product complies with requirements of Contract Documents and reviewed submittals.
 - 2. Quantities are correct.
 - 3. Accessories and installation hardware are correct.
 - 4. Containers and packages are intact and labels legible.
 - 5. Products are protected and undamaged.

1.4 STORAGE AND PROTECTION

- A. Handle and store materials for construction, products of demolition, and other items to avoid damage to existing buildings, and infrastructure.
- B. 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.

- C. 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.
- D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter. Cover such material to prevent material from being blown or transported away from the stockpile.
- E. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.5 SUBSTITUTIONS

- A. 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, mechanical and electrical requirements, performance, and warranties.
- B. After the bid opening, the Contractor shall submit sufficient data in accordance with this Section to establish equality. The Authority shall be the sole judge of equality and acceptability.
- C. 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.
- D. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.
- E. The Authority will consider requests for Substitutions only within 28 days after date established by the Notice to Proceed.
- F. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- G. Document each request with complete data substantiating compatibility of proposed Substitution with Contract Documents.
- H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.6 SUBSTITUTION SUBMITTAL PROCEDURE:

- A. Submit Request for Substitution for consideration on Substitution Request Form provided by the Authority (Section 01 60 00-A). Limit each request to one proposed Substitution.
- B. Submit certification signed by the Contractor, that the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product. List similar projects using proposed product, dates of installation and user telephone number.
 2. Will provide an equivalent warranty for the Substitution as for the specified Product.
 3. Will coordinate installation and make changes to other Work, which may be required for the Work to be complete with no additional cost to the Authority.
 4. Waives claims for additional costs or time extension, which may subsequently become apparent from indirect costs.
 5. Will reimburse the Authority for review or redesign services associated with re-approval by Authorities.
- C. Submit shop drawings, manufacturers' product data, and certified test results attesting to the proposed Product equivalence and variations between substitute and specified product. The burden of proof is on proposer.
- D. The Authority will notify the Contractor in writing of decision to accept or reject request.

PART 2 – PRODUCTS

2.1 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.
- D. Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

2.2 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers followed by the term "No Substitutions": use only specified manufacturers, no substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named that meets the description specifications of the named manufacturers, equal in substance, function, dimension, appearance, and quality.

PART 3 – EXECUTION (NOT USED)

END OF SECTION



Project: Tuluksak Power Plant Upgrade Project

Project No.: 26070

Contractor: _____

Specified item for which substitution is requested: _____
(reference specification section and paragraph)

The following product is submitted for substitution: _____
(describe proposed substitution and differences from specified item; attach complete technical, performance, and test data; state whether substitution affects dimensions and functional clearances shown on drawings or affects other trades, and include complete information for changes to drawings and/or specifications which proposed substitution will require for its proper installation.)

I certify the following:

- | Yes | No | |
|--------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | The substitute will perform adequately and achieve the results called for by the general design. |
| <input type="checkbox"/> | <input type="checkbox"/> | The substitute is similar, of equal substance, suited to the same use, and will provide the same warranty as the product specified. |
| <input type="checkbox"/> | <input type="checkbox"/> | An equivalent source of replacement parts is available. |
| <input type="checkbox"/> | <input type="checkbox"/> | The evaluation and approval of the proposed substitute will not delay the Substantial or Final Completion of the project. |
| <input type="checkbox"/> | <input type="checkbox"/> | Any change in the design necessitated by the proposed substitution will not delay the Substantial or Final Completion of the project. |
| <input type="checkbox"/> | <input type="checkbox"/> | The cost of any change in the design necessitated by the proposed substitution, including engineering and detailing costs, and construction costs caused by the substitution will be paid by the Contractor at no cost to the Authority. |
| <input type="checkbox"/> | <input type="checkbox"/> | The cost of any license fee or royalty necessitated by the proposed substitution will be paid by the Contractor at no cost to the Authority. |

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Signed: _____ Date: _____
Authorized Contractor Signature

Architect/Engineer Recommendation:

- Accepted Accepted as Noted Not Accepted Received Too Late

Remarks:

Signed: _____ Date: _____
Architect/Engineer

Accepted
 Rejected
_____ Date: _____
Project Manager

SECTION 01 64 00
RECEIPT OF OWNER FURNISHED MATERIALS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This section describes receipt, unloading, transportation, storage, and handling of materials furnished by the Owner (Authority) for this project as described herein.
- B. See Section 01 11 13 – Summary of Work for delivery dates for Owner Furnished materials.

1.2 RELATED REQUIREMENT

- A. Section 01 11 13 – Summary of Work.

1.3 DESCRIPTION OF OWNER FURNISHED MATERIAL

- A. All Owner Furnished equipment will be staged at the Alaska Energy Authority Warehouse, 2601 Commercial Drive, Anchorage Alaska 99501. The Contractor will make arrangements with the Authority to receive the items at this location and take possession.
- B. Engine Generator #3: One each John Deere 6090 fabricated engine generator assembly as detailed in the Engine Generator Specifications 26 32 13 and shown on the Drawings. The engine generator has been fully assembled, functionally tested and approved by the Authority, and packaged in accordance with the Specifications. The overall dimensions are approximately 8'-6" long by 3'-0" wide by 4'-6" high and the weight is estimated at 5,000#.
- C. Engine Generator #4: One each John Deere 6135 fabricated engine generator assembly as detailed in the Engine Generator Specifications 26 32 13 and shown on the Drawings. The engine generator has been fully assembled, functionally tested and approved by the Authority, and packaged in accordance with the Specifications. The overall dimensions are approximately 9'-6" long by 3'-6" wide by 5'-0" high and the weight is estimated at 6,500#.
- D. Engine Generator Accessories: One lot loose ship accessories as detailed in the Engine Generator Specifications 26 32 13 and shown on the Drawings. The accessories will be packaged on four pallets with a total estimated weight of 1,500#.

1.4 ACCEPTANCE OF OWNER FURNISHED MATERIAL

- A. The Contractor shall (1) receive and accept the materials at the staging location specified; (2) inspect all materials to confirm that the materials delivered are in good condition and the quantities are correct; and (3) execute a receipt for all materials accepted from the Authority. Delinquency in signing material receipts may result in delayed progress payments.
- B. All material furnished by the Authority shall comply with the plans and specifications. All materials which do not meet specifications or are received broken or damaged shall

be culled by the Contractor and a report made to the Authority within 5 days of receipt of material as to the number culled and reason for culling.

- C. If the Authority fails to deliver the materials according to the dates set forth in Section 01 11 13 – Summary of Work, the Contractor's sole remedy and compensation shall be an extension of time not greater than the delay. Any such time extension shall be requested in writing by the Contractor.

1.5 RECEIPT, TRANSPORTING AND STORING OWNER FURNISHED MATERIAL

- A. The Contractor shall receive, transport, and protect all material in accordance with accepted industry standards.
- B. All handling charges required for receiving, loading, unloading, hauling, transporting or storing the material shall be provided by the Contractor.
- C. Any demurrage charges or other fees incurred as a result of the Contractor not receiving, moving and storing the material shall be paid by the Contractor. If the Authority is required to pay these fees, the fees will be deducted from the first Contractor pay request.
- D. The Contractor shall provide proper equipment as necessary to load, unload, and transport Owner furnished material. The equipment shall be rated as required to properly handle the material.

1.6 DAMAGE TO OWNER FURNISHED MATERIAL

- A. Upon receipt of the materials as specified above, the Contractor shall become solely responsible for their care, transportation, storage, and protection. In the event that materials are damaged, lost, stolen, or destroyed by any cause whatsoever after the Contractor has signed a receipt for them, their repair or replacement shall be entirely at the Contractor's expense.
- B. All material replaced by the Contractor shall be equal to the material provided by the Authority and shall meet the material purchase specifications.

1.7 STORAGE OF OWNER FURNISHED MATERIAL

- A. The Contractor shall provide secure storage for all Authority furnished material and shall be responsible for transporting the material to the jobsite as required to support the construction schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 71 13
MOBILIZATION AND DEMOBILIZATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for mobilization and demobilization.

1.2 RELATED REQUIREMENTS

- A. Section 01 11 13 – Summary of Work.
- B. Section 01 29 73 – Schedule of Values.
- C. Section 01 29 76 – Application for Payment.
- D. Section 01 51 00 – Construction Facilities.
- E. Section 01 77 00 – Contract Closeout Procedures.

1.3 DEFINITIONS

- A. Mobilization and Demobilization includes:
 - 1. Travel to the project site of all personnel, including sub-contractors, and return upon completion of the Work.
 - 2. Delivery to the Site of all construction equipment, tools, supplies, temporary facilities, etc. ready for commencing and prosecuting the Work, and the subsequent removal from the site upon completion of the Work.
 - 3. Delivery to the Site of all required project materials, including Owner Furnished Equipment. Removal of any leftover materials from the site upon completion of the Work. Note that with agreement of the Authority, leftover materials may be left on the project site if placed in a neat and orderly fashion at a location approved by the Authority.
 - 4. The preparation of the Contractor's work area; the complete assembly of equipment necessary to perform the required work; and all other preparatory work required to permit commencement of the actual Work.

1.4 REQUIREMENTS

- A. Haul routes, staging areas, and equipment positioning at the project site will be subject to approval by the Authority, who will coordinate with Contractor to determine requirements and locations.
- B. Cooperate with the Authority in allocation and use of Mobilization and Demobilization areas of Site, field offices and sheds, materials storage, traffic, and parking facilities.
- C. During construction, coordinate use of Site and facilities through the Authority.

- D. Comply with Authority's procedures of contract communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Authority for use of utilities and construction facilities.
- F. Coordinate field engineering and layout Work under instructions of the Authority.
- G. Walk through Site with the Authority prior to start of Work.

1.5 SUBMITTALS

- A. Refer to Section 01 33 00 – Submittal Procedures, for submittal requirements.
- B. If requested by the authority, submit a plan of the proposed layout of the construction site, including equipment, access ways, temporary facilities, staging, and storage areas, within four (4) calendar weeks after Notice to Proceed.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXECUTION REQUIREMENTS

- A. Delivery to the jobsite of construction tools, equipment, materials, and supplies shall be accomplished in conformance with applicable ordinances, regulations, and the requirements of the Contract Documents.
- B. Upon completion of the Work, remove construction tools, apparatus, equipment, unused materials and supplies, and personnel from the jobsite.

END OF SECTION

SECTION 01 73 00
EXECUTION REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for addressing defects, cleaning, operating and maintenance manuals, spare parts, training, warranties and bonds, and maintenance service.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions: Fiscal provisions, legal submittals, and other administrative requirements.
- B. Section 01 26 63 – Change Procedures.
- C. Section 01 31 19 – Project Meetings.
- D. Section 01 33 00 – Submittal Procedures.
- E. Section 01 33 23 – Shop Drawings, Product Data, and Samples.
- F. Section 01 60 00 – Material and Equipment.
- G. Section 01 74 00 – Cleaning and Waste Management.

1.3 CLOSEOUT PROCEDURES

- A. Comply with Section 01 77 00 - Contract Closeout Procedures.

1.4 DEFECTS

- A. Product defects shall be all items that affect the visual appearance or function of the Products. Defects shall be as identified below unless more stringent requirements are specified within specific sections.
- B. Products shall typically be viewed from a distance of 30.0 inches (760 mm).
- C. Defects shall be solely determined by the Authority.
- D. Defects, Product:
 - 1. Cuts, Scrapes, Gouges Abrasions 0.250 inch (6 mm) long or longer, and 0.03125 inches (0.79375 mm) wide or wider that are visible at a distance of 30.0 inches (762 mm) shall be considered defects.
 - 2. Abrasions less than the above shall be accepted.
 - 3. Burns of any size that permanently discolor the surface material shall be considered defects.
 - 4. Product color variation.
- E. Defects, Joint:
 - 1. Non-alignment of Products. Visual defects and non-alignment of joints shall be considered defective.

- F. Defects, Structural:
 - 1. Bent members or other structural damage shall be considered defective.
 - 2. Incorrectly manufactured members shall be considered defective.
- G. Defects, Corrosion:
 - 1. Surface corrosion not exceeding one percent (1%) of the surface area shall be considered a visual defect.
 - 2. Surface corrosion exceeding one percent (1%) and not exceeding five percent (5%) of the surface area shall be evaluated by the Authority to determine defect type.
 - 3. Surface corrosion exceeding five percent (5%) of the surface area shall be considered a structural defect.
- H. Defects shall be repaired or replaced at no additional cost to the Authority.
 - 1. Structural defects shall be replaced, no exceptions.
 - 2. Visual defects shall be repaired or replaced as solely determined by the Authority.

1.5 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain work and storage areas free of waste materials, debris, and rubbish. Maintain site in a neat and orderly condition to maintain safe passage and exits and to avoid fire and tripping hazards. Provide covered containers for deposit of waste materials.
- B. Collect and remove waste materials, debris, and rubbish from site periodically and at least weekly, and dispose off-site. Have equipment and personnel available on-site daily to sweep and clean work sites and interior work areas.
- C. Comply with Section 01 74 00 – Cleaning and Waste Management.

1.6 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion inspection.
- B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances.
- C. Use materials which will not create hazards to health or property, and which will not damage surfaces. Follow manufacturer's recommendations.
- D. Maintain cleaning until the Authority issues certificate of Substantial Completion.
- E. Remove waste, debris and surplus materials from site. Clean work site and interior work areas; remove stains, spills, and foreign substances from all areas and sweep clean. Rake clean work site. Comply with Section 01 74 00 – Cleaning and Waste Management.

1.7 ADJUSTING

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

1.8 OPERATION AND MAINTENANCE (O&M) DATA

- A. Provide Operation and Maintenance Manuals for specific equipment as described in the Technical Specifications. For this project O&M Manuals are only required for the switchgear and the fire alarm/suppression system.
- B. Unless otherwise directed in these documents or by the Authority, provide each submittal as an electronic portable document format (PDF) file, transmitted via email. If file is too large to be received by the Authority via email, provide a download link, deliver in portable USB drive, or as otherwise instructed by the Authority

1.9 TRAINING

- A. Before Substantial Completion, instruct the local operator(s) and Authority's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in the Technical Specifications. These shall be labeled and stored per manufacturer's recommendations and as specified.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to Substantial Completion payment.

1.11 WARRANTIES AND BONDS

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 – GENERAL

1.1 GENERAL

- 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 disposed of daily. The Contractor shall take particular care to eliminate any hazards created by these operations.
- B. All cleaning shall be performed to the satisfaction of and at no additional cost to the Authority.

1.2 RELATED REQUIREMENTS

- A. Section 01 73 00 – Execution Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROGRESS CLEANING

- A. At the completion of the project, or prior thereto if so directed by the Authority, the Contractor shall be responsible for completely cleaning those portions of the project which his work affects.
- B. Contractor shall remove from the facility all tools, equipment, surplus materials, temporary structures, and other material not incorporated in the permanent installation.
- C. Restoration of Damaged Property: To the extent that any roads, 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 inspection. 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.
- D. General cleaning and restoration must be accomplished prior to Substantial Completion.
- E. Final cleaning and restoration must be accomplished prior to Final Completion.
- F. Disposal of hazardous and construction materials shall be accomplished as specified in Section 00 70 00 – General Conditions and this Section.

3.2 WASTE DISPOSAL

- A. Salvaged Material: All salvaged items not being reinstalled shall be turned over to the Owner or Utility as indicated in the Drawings.
- B. General Construction Waste: Waste generated during the process of completing the

project scope of work shall be removed from the limits of the project site and disposed of. All general construction waste shall be disposed of as required by local, state and federal laws, rules, regulations and requirements.

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for Substantial Completion.
- B. Requirements for Final Completion.
- C. Requirements for Final Acceptance and Payment.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions: Substantial Completion, Final Completion, Final Payment, Final Acceptance.
- B. Section 01 11 13 – Summary of Work.
- C. Section 01 29 73 – Schedule of Values.
- D. Section 01 29 76 – Application for Payment.
- E. Section 01 33 00 – Submittal Procedures.
- F. Section 01 73 00 – Execution Requirements
- G. Section 01 78 39 – Project Record Documents.

1.3 SUBSTANTIAL COMPLETION SUBMITTALS

- A. The following items must be submitted to the Authority prior to requesting the Substantial Completion Inspection:
 - 1. All test reports including electrical and mechanical systems.
 - 2. Project Record Documents.
 - 3. Operation and Maintenance Data.
 - 4. Warranties and Bonds.
 - 5. Any required certificates of inspection.
- B. The following items must be available at the project site prior to requesting the Substantial Completion Inspection:
 - 1. Spare Parts and Maintenance Materials.
 - 2. Keys.
- C. No progress payments will be made for Substantial Completion until all required submittals have been submitted and accepted by the Authority.

1.4 SUBSTANTIAL COMPLETION

- A. In accordance with Section 00 70 00 – General Conditions, Article 13.10 Substantial Completion, the Contractor shall notify the Authority in writing that the Work or a

portion of the Work which has been specifically identified in the Contract Documents (except for items specifically listed by the Contractor as incomplete) is substantially complete and request that the Authority issue a Certificate of Substantial Completion, see Section 01 77 00A - Certificate of Substantial Completion. The Authority will consider the Contractor's request for Substantial Completion only when:

1. Written request for Substantial Completion is provided at least ten (10) calendar days in advance of the Substantial Completion inspection date.
 2. Pre-Commissioning Substantial Completion Inspection Checklist is submitted, see Section 01 11 13 – Summary of Work. Note on the checklist any known items needing to be completed or corrected.
 3. All equipment and systems have been tested, adjusted, are properly operating and fully functional.
 4. All automated and manual controls are fully operational and the entire system is ready for commissioning.
- B. When all of the preceding requirements for the consideration of Substantial Completion have been met, the Authority and/or their designee will conduct a scheduled Substantial Completion inspection. If upon the completion of the inspection, the Authority should find that the Work is not substantially complete, the Authority will promptly notify the Contractor in writing, listing observed deficiencies.
- C. The Contractor shall remedy deficiencies and send a second written notice of Substantial Completion.
- D. When the Authority finds the Work is substantially complete, it will issue a certificate of Substantial Completion with an attached punch list of deficiencies, all in accordance with the provisions of the General Conditions.
- E. The Contractor shall be responsible for scheduling the activities required for Substantial Completion to enable completion within the Contract Time.

1.5 FINAL COMPLETION

- A. In accordance with Section 00 70 00 – General Conditions, Article 13.13 Final Completion, when the Contractor considers that it has completed all the deficiencies listed on the Substantial Completion punch list, and that the Work is otherwise complete, it shall submit written certification that:
1. Contract Documents have been reviewed.
 2. Work has been completed in accordance with Contract Documents, and deficiencies listed with certificate of Substantial Completion have been corrected.
 3. Work is complete and ready for final inspection.

- B. Upon the receipt of the preceding written notice, the Authority will conduct a Final Completion inspection. If the Authority should then find the Work to be incomplete, it will promptly notify the Contractor in writing with a list of observed deficiencies.
- C. The Contractor shall remedy deficiencies and transmit to the Authority a second certification of Final Completion.
- D. The Authority reserves the right to review photographic documentation in lieu of on-site inspection.
- E. When the Authority determines the Work is complete, all in accordance with the General Conditions article, "Final Completion and Application for Payment", the Contractor may make application for Final Payment.

1.6 REINSPECTION FEES

- A. In accordance with Section 00 70 00 – General Conditions, Articles 13.10 Substantial Completion and 13.12 Final Inspection, the Contractor shall pay for all costs incurred by the Authority for re-inspection.
- B. The Authority may deduct the re-inspection costs from the application for final payment.

1.7 FINAL ACCEPTANCE AND PAYMENT

- A. Following the issuance of Final Completion, and subject to the completion of requirements specified in Section 00 70 00 – General Conditions, Articles 13.14 Final Payment and 13.15 Final Acceptance, the Authority will review the project files for completeness. The Authority may require the Contractor to submit or re-submit any of the following documents, upon request:
 - 1. Contractor's transmittal letter: O&M Manuals.
 - 2. Contractor's transmittal letter: Warranty/Bonds.
 - 3. Contractor's transmittal letter: Record Documents.
 - 4. Spare parts, maintenance materials receipts.
 - 5. Contractor's certification of insurance.
 - 6. Submittals and miscellaneous registers.
 - 7. Original final pay estimate.
 - 8. Contractor's release.
 - 9. Department of Labor Notice of Completion (NOC).
 - 10. Other documentation as required by the Authority.
- B. Statement of Adjustment of Accounts – The Authority may require the Contractor to submit a final statement reflecting adjustments to the Contract Price showing:
 - 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 Re-inspection Fees.
 9. Other adjustments to Contract Price.
 10. Total Contract Price as adjusted.
 11. Previous payments.
 12. Sum remaining due.
- C. The Authority will issue a final Change Order reflecting all remaining adjustments to Contract Price not previously made by Change Orders.
- D. See Section 01 29 73 – Schedule of Values for minimum value that shall be assigned for Final Acceptance.
- E. The Contractor shall cooperate with the Authority and shall provide the requested documentation.
- F. When the Authority determines its files are complete, it will make final payment and issue a letter of Final Acceptance.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION



CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: Tuluksak Power Plant Upgrade Project

A/E Project Number: _____

To: _____

Community: _____

Contract Number: _____

From: Alaska Energy Authority

Contract Date: _____

The work performed under this contract has been reviewed and found to be substantially complete. The date of substantial completion of the project or portion thereof designated above is hereby established as _____ which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

Definition of Date of Substantial Completion

The Date of Substantial Completion of the Work or designated portion thereof is the date certified by the Project Manager when construction is sufficiently complete in accordance with the Contract Documents, so the _____ can occupy or utilize the work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the Project Manager is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work associated with the Contract Documents.

The date of commencement of warranties for items on the attached list will be the date of final payment unless otherwise agreed to in writing.

Attachments:

Alaska Energy Authority:

Project Manager

Date: _____

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 - General Conditions: Record Documents.
- B. Section 01 11 13 – Summary of Work.
- C. Section 01 29 76 – Application for Payment.
- D. Section 01 33 23 – Shop Drawings, Product Data.
- E. Section 01 77 00 – Contract Closeout Procedures.
- F. Technical Specifications: Manufacturer's certificates and certificates of inspection.

1.3 MAINTENANCE OF RECORD DOCUMENTS

- A. In addition to requirements in General Conditions, maintain at the site for the Authority one accurate and up to date record copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings and product data.
 - 6. Field test records.
 - 7. Inspection certificates.
 - 8. Manufacturer's certificates.
- B. Prior to Substantial Completion, provide original or legible copies of each item maintained by the Contractor.
- C. Delegate responsibility for management of maintenance of Record Documents to one person on the Contractor's staff as approved in advance by the Authority.
- D. Promptly following award of Contract, secure from the Authority, at no cost to the Contractor, one 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 the Authority.
- J. Do not use job set for any purpose except entry of new data and for review and copying by the Authority.
- K. Keep record documents and samples available for inspection by the Authority.
- L. Upon request by the Authority, and at time of each Application for Payment, enable inspection of Record Documents by the Authority for review as to completeness.
- M. Prior to submitting request for Final Payment, obtain the Authority's approval of final Record Documents.

1.4 RECORDING

- A. Record information on a set of 'black-line' opaque Drawings, and in a copy of a Project manual, provided by the Authority.
- B. Using felt tip marking 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 a RFI's, 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 locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 - 2. Field changes of dimension and detail.
 - 3. Changes made by modifications.
 - 4. Details not on original Contract Drawings.
 - 5. References to related Shop Drawings and modifications.

6. Clearly label all changes and show dimensions to establish size and location. All identifications shall be sufficiently descriptive to relate reliably to Specifications.
- F. Other Documents: Maintain manufacturer's certifications, inspection certifications, and field test records required by individual Specifications sections.

1.5 SUBMITTAL OF RECORD DOCUMENTS

- A. Upon submittal of the completed Record Documents, make changes in Record Documents as required by the Authority.
- B. Transmit with cover letter in duplicate, listing:
 1. Date.
 2. The 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 the Contractor or authorized representative.
- C. Final Record Documents shall include both hard copies and digitally scanned copies in *.PDF format (high quality grayscale scans, minimum 200 pixels/inch). Scans shall include front and back of drawings/documents where information occurs on both sides.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Selective demolition.

1.2 RELATED REQUIREMENT

1.3 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SCOPE

- A. Remove items intended for demolition as indicated on the Drawings.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Provide, erect, and maintain temporary barriers and security devices.
 - 3. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permit.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. If hazardous materials are discovered during removal operations, stop work and notify the Authority. Hazardous materials include but are not limited to fuels, regulated asbestos containing materials, lead, PCB's, and mercury.

3.3 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits and locates.
- B. Do not disrupt utilities without permit from authority having jurisdiction.
- C. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

3.4 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site or returned to the local utility company.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 05 12 10
STRUCTURAL STEEL FRAMING AND FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members and support members.
- B. Plates and fabricated connections.

1.2 WORK INCLUDED

- A. This section includes fabrication and erection of structural steel work as shown on the Drawings.
 - 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, steel floor structures, foundation beams and supports, stairways, landings, handrails, support platforms, and other miscellaneous steel fabrications.

1.3 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry
- B. Section 07 21 00 - Thermal Insulation
- C. Section 09 91 00 – Painting

1.4 REFERENCE STANDARDS

- A. AISC (MAN) – Steel Construction Manual; American Institute of Steel Construction, Inc.
- B. AISC S303 – Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.
- C. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
- D. ASTM 53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- E. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
- F. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- G. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- H. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts.
- I. ASTM A572 /A572M – Standard Specification for High-Strength Low-Alloy

Columbium-Vanadium Structural Steel.

- J. ASTM A992/A992M – Standard Specification for Structural Steel Shapes.
- K. ASTM F436 – Standard Specification for Hardened Steel Washers.
- L. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength.
- M. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.
- N. AWS D1.1/D1.1M – Structural Welding Code – Steel; American Welding Society.

1.5 SUBMITTALS

- A. Product data or manufacturer’s specifications and installation instructions for products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and fasteners.
 - 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
 - 3. Note that if all items will be fabricated exactly as indicated on the Drawings, the design Drawings can be submitted in lieu of shop drawings.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis, and non-destructive test analysis.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.6 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC “Steel Construction Manual”.
- 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Fabricate or 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.
- C. Do not store materials 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. Steel Shapes: ASTM A36/A36M.
- C. Steel Plate: ASTM A36/A36M.
- D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- E. Pipe: ASTM A53/A53M, Grade B, Finish black.
- F. Electrodes for Welding: Comply with AWS Code.
- G. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 or A325M, Type 1, medium carbon, galvanized, with matching compatible ASTM A563 or A563M nuts and ASTM F436 washers.

2.2 FABRICATIONS

- A. Provide custom fabrications as indicated in the Drawings. Where fabrications will differ from design or where additional detail is required, provide specific shop drawings for approval. Fabricated items shall include but not be limited to:
 - 1. Radiator support brackets and canopies.
 - 2. Generator support pedestals.
- B. Shop fabricate to greatest extent possible.
- C. 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.
- D. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- E. Fabricate connections for bolt, nut, and washer connectors.
- F. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- G. Assemble and weld built up sections by methods that will produce true alignment of axes without warp.
- H. 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.
- I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- J. Tolerances: Structural component tolerances shall be +/- 1/8 inch and as required to adequately support loads.

2.2 STEEL COATING

- A. The steel members and fabrications shall be coated in accordance with the Drawings and Specifications.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.
- B. 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.
- C. 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.

3.2 ERECTION

- A. Erect structural steel in compliance with AISC “Code of Standard Practice for Steel Buildings and Bridges”.
- B. Temporary Shoring and Bracing: Allow for erection loads, and 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.
- C. 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.
- D. 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.
- E. Level and plumb individual members of structure within specified AISC tolerances.
- F. 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 the Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.
- G. Touch-Up Repairs: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint or galvanizing.
- H. Coating Repair: If underlying metal surface is exposed, wheel abrade or sandblast to clean metal and re-coat same as original fabrication. If damage does not fully penetrate coating then reapply top coat only to minimum DFT.
- I. Field weld components indicated on shop drawings.
- J. Do not field cut or alter structural members without approval of Engineer.

3.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. The Authority, or Authority’s representatives, will visually inspect welded connections.
- B. The Authority reserves the right to contract an independent testing firm to test welded connections.

- C. Provide access for the Authority's 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. The Authority 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.
- 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.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY

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

1.2 RELATED REQUIREMENTS

- A. Section 05 12 10 – Structural Steel Framing and Fabrications
- B. Section 07 21 00 - Thermal Insulation

1.3 REFERENCES

- A. American Forest and Paper Association (AFPA) Manual for Wood Frame Construction
- B. Engineered Wood Association
Form E30 Engineered Wood Design/Construction Guide
- C. American Society of Mechanical Engineers (ASME)
 - B18.2.1 Square and Hex Bolts and Screws (Inch Series)
 - B18.6.1 Wood Screws (Inch Series)
- D. 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
- E. American Wood Preservers Association (AWPA)
 - C2 Lumber, Pressure Treatment

M4 Standard for the Care of Preservative-Treated Wood
Products

- F. Federal Specification (FS)
 - FF-N-105B Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
- G. International Conference of Building Officials (ICBO)
 - International Building Code (IBC) Chapter 23 Wood
- H. 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)

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each distinct product specified.
- B. 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.

1.5 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

2.1 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)
No. 17 Standard Grading Rules for West Coast Lumber
 - 2. Western Wood Products Association (WWPA)
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.

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.
- D. 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.

2.2 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 AWWA C2 (lumber) and AWWA C9 (plywood). Mark each treated item with Quality Mark Requirements of inspection agency approved by ALSC's Board of Review.
- B. 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 indicated on Drawings as treated.
 - 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, steel floors, or directly in contact with earth.
- C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.60 lb./cu. ft.
- D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWWA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.3 DIMENSION LUMBER

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

2.4 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.

2.5 SHEATHING

- A. Exterior rated Type PS-1 structural plywood of the thickness indicated.

2.6 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.

2.7 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, minimum G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

PART 3 – EXECUTION

3.1 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.

3.2 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.

3.3 WOOD FURRING

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 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. Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel.
- E. 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.

- 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. 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 Drawings.
- H. Sheathing and Structural Panel Standard: Comply with applicable recommendations in APA Form No. E30, Engineered Wood Construction Guide.

END OF SECTION

SECTION 06 82 00

FIBERGLASS REINFORCED (FRP) WALL PANELS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Prefinished polyester glass reinforced plastic sheets, Class A rated.
- B. Molding and trim.
- C. Adhesives and fasteners.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry

1.03 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 1. ASTM D 256 - Izod Impact Strengths (ft #/in)
 - 2. ASTM D 570 - Water Absorption (%)
 - 3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
 - 4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
 - 5. ASTM D 2583 - Barcol Hardness
 - 6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
 - 1. Manufacturer's data sheet for panels including verification of Class A rating, color, and surface profile.
 - 2. Manufacturer's data sheets for all molding, trim, fasteners, adhesives, and accessories.
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- B. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
2. Wall Required Rating – Class A

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Building to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work.
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.08 WARRANTY

- A. Furnish one year guarantee against defects in material and workmanship.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Marlite or approved equal.
- B. Product: Class A rated FRP.

2.02 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 2. Dimensions:
 - a. Thickness – 0.090 “ (2.29mm) nominal
 - b. Width - 4'-0” (1.22m) nominal
 - c. Length – 8'-0”, 10'-0”, or 12'-0” as required to minimize joints for wall and ceiling layout indicated on drawings.
 3. Tolerance:
 - a. Length and Width: +/-1/8 “ (3.175mm)
 - b. Square - Not to exceed 1/8 “ for 8 foot (2.4m) panels or 5/32 “ (3.96mm) for 10 foot (2.4m) panels

- B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.
 - 1. Flexural Strength - 1.0×10^4 psi per ASTM D 790. (7.0 kilogram-force/square millimeter)
 - 2. Flexural Modulus - 3.1×10^5 psi per ASTM D 790. (217.9 kilogram-force/square millimeter)
 - 3. Tensile Strength - 7.0×10^3 psi per ASTM D 638. (4.9 kilogram-force/square millimeter)
 - 4. Tensile Modulus - 1.6×10^5 psi per ASTM D 638. (112.5 kilogram-force/square millimeter)
 - 5. Water Absorption - 0.72% per ASTM D 570.
 - 6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
 - 7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256.
- C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- D. Color and Finish:
 - 1. Color: White.
 - 2. Finish: Embossed (pebbled).

2.03 ACCESSORIES

- A. PVC Trim: Thin-wall semi-rigid extruded PVC.
 - 1. M350 Inside Corner.
 - 2. M360 Outside Corner.
 - 3. M365 Division.
 - 4. M390 Edge.
 - 5. Color White.
- B. Fasteners: Non-staining nylon drive rivets.
 - 1. Length to suit project conditions.
 - 2. Color White.
- C. Adhesive: Adhesives complying with ASTM C 557.
- D. Sealant: White polyurethane sealant, Sikaflex 1a or approved equal.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails and screws countersunk, joints and cracks filled flush and smooth with the adjoining surface.

- B. Repair defects prior to installation. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

3.02 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut sheets to meet supports allowing 1/8" (3 mm) clearance for every 8 foot (2.4m) of panel.
 - 1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
 - 2. Pre-drill fastener holes 1/8" (3mm) oversize with high speed drill bit.
 - a. Space at 8" (200mm) maximum on center at perimeter, approximately 1" from panel edge.
 - b. Space at in field in rows 16" (40.64cm) on center, with fasteners spaced at 12" (30.48 cm) maximum on center.
- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
 - 1. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - 2. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
 - 3. Drive fasteners for snug fit. Do not over-tighten.
- D. Apply panel moldings to all panel edges using sealant providing for required clearances.
 - 1. All moldings must provide for a minimum 1/8 " (3mm) of panel expansion at joints and edges, to insure proper installation.
 - 2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.03 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations. Do not use abrasive cleaners.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Polystyrene foam-plastic board.
- B. Fiberglass batt or blanket.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-In-Place Concrete
- B. Section 05 12 10 - Structural Steel Framing and Fabrications
- C. Section 06 10 00 - Rough Carpentry
- D. Section 31 23 00 - Excavation and Fill
- E. Section 31 23 33 - Trenching and Backfill For Utilities.
- F. Section 33 61 14 - PEX Arctic Pipe
- G. Section 33 61 24 - Steel Arctic Pipe

1.3 SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Do not expose foam-plastic board to sunlight except to necessary extent for period of installation and concealment.

PART 2 – PRODUCTS

2.1 POLYSTYRENE FOAM-PLASTIC BOARD

- A. Insulation Board: Extruded polystyrene rigid insulation. Maximum water absorption shall not exceed 0.3% by volume, as determined in ASTM C272. Thermal resistance (R-value) shall not be less than 4.5 per inch at 75°F as determined by ASTM C177. The minimum board size shall be 2-inches by 2-feet by 8-feet. Compressive strength at yield or 10% deformation shall not be less than 40 PSI. Dow Styrofoam Hi-40 or approved equal.

2.2 SPRAY FOAM INSULATION

- A. Spray Foam: Single component polyurethane spray foam insulation. Minimum 80% closed cell content. Great Stuff Pro or approved equal.

2.3 FIBERGLASS BATT

- A. Blanket/Batt Insulation: Roll or batt type blanket insulation, fiberglass or mineral wool. Minimum R value 13 for 3-1/2" thickness and 19 for 6-1/2" thickness.

PART 3 – EXECUTION

3.1 INSTALLATION OF INSULATION BOARD

- A. Prior to placing the insulation board, blade, shape, and compact subgrade to a flat, smooth, firm, and unyielding surface. Visually inspect embankment surface and remove bumps, ruts, deleterious material, debris, and any other objects that may prevent proper installation, attachment, and performance of the insulation board.
- B. Place a sand bedding leveling course at least two (2) inches thick on the subgrade.
- C. Set each board accurately to the line and grade established and anchor firmly in place.
- D. Do not compact fill over insulation until it is completely thawed through its entire thickness.
- E. Use caution and appropriate construction techniques to ensure the insulation is protected and not damaged during formation of embankments.
- F. Remove and replace, at no cost to the Authority, any insulation that has been damaged or displaced.

3.2 INSTALLATION OF SPRAY FOAM

- A. Completely fill spaces between existing foam insulation and framing members to create a weather seal and unbroken thermal envelope around the building interior.
- B. Fill and seal gaps between framing members and/or sheathing that cannot be filled with rigid foam or fiberglass batt.

3.3 INSTALLATION OF FIBERGLASS BATT

- C. Completely fill spaces to create a complete and unbroken thermal envelope around the building interior.
- D. Prior to covering, ensure that all insulation is secure so that it will not settle and create voids.
- E. Install a minimum 6 mil polyethylene sheet vapor barrier over all interior surfaces. Tape all seams and joints.

END OF SECTION

SECTION 07 42 13
FORMED METAL WALL PANELS

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 SUBMITTALS

- A. Product Data: Metal panels, fasteners, sealants, and accessories.
- B. Shop Drawings:
 - 1. Panel layout and lengths.
 - 2. Fastening requirements.
 - 3. Trim, flashing, sealant, and other details of installation.
- C. Manufacturer's installation instructions.

1.3 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.

1.4 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.

1.5 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.

1.6 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: Magic Metals or approved equal.

2.2 METAL WALL PANELS

- A. Metal Wall Panels: Magic Metals Husky High 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. Nominal 36” wide fabricated panels with integral continuous overlapping seams.
 - 3. Seam Height: 1-1/4” high major ribs at 12” centers with minor ribs at 4” centers.
 - 4. Minimum Thickness: 24 gauge.
- B. Panel Finish: One coat silicone modified polyester (SMP). Color as indicated on Drawings.
- C. Fasteners: Fasteners and accessories for installation of panel system as recommended by panel manufacturer for the system specified.

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: 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, 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.

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 92 00
JOINT SEALANT

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Furnishing and installing all sealant where indicated on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Division 1.
- B. Section 23 05 00 - Common Work Results for Mechanical.

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 QUALITY ASSURANCE

- A. Installers: Use only skilled workmen specially trained in the techniques of sealing and familiar with the published recommendations of the manufacturers of the sealants being used.
- B. Verify that sealants are compatible with the substrates and accessory materials provided under other Sections. Notify Engineer of evidence of incompatibility.

1.5 ENVIRONMENTAL CONDITIONS

- A. Install and protect sealants under conditions recommended by the manufacturer and as follows:
 - 1. Do not apply sealant when ambient temperatures are below 40 degrees F, or expected to fall below 40 degrees F before sealant cure is complete.
 - 2. Do not apply sealant to substrates or accessories that are moist.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Polyurethane-based sealant, Sika Sikaflex 1A, or approved equal, meeting Fed. Spec. TT-S- 00230C, Type II, Class A.
- B. Color shall be gray except where installed against white finished surfaces color shall be white.

2.2 ACCESSORY MATERIALS

- A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Authority in writing of conditions detrimental to the proper and timely completion of the Work.
- B. Verify joint dimensions and conditions are acceptable to receive the work of this Section.
- C. Beginning of installation means acceptance.

3.2 PREPARATION

- A. Clean and prepare joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter which might impair adhesion of sealant.
- B. Apply masking tightly around joints to protect adjacent surfaces from excess sealant.
- C. Prime as required by manufacturer for proper bond to substrate materials.
- D. Prepare joint to achieve proper sealant width/depth ratios as indicated. Install backer rod where required to achieve correct joint profile.

3.3 INSTALLATION

- A. Install sealant in strict accordance with manufacturer's instructions.
- B. Sealant beads shall have a section as detailed in the Drawings.
- C. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- D. Tool joints concave, unless otherwise indicated. Finish free of air pockets, foreign embedded matter, ridges and sags.
- E. Coat finished and cured sealant joints with coating system indicated in the Drawings, see Section 09 91 00 - Painting.

3.4 CLEANUP

- A. Clean adjacent surfaces free of excess sealant as the work progresses. Use cleaning agents recommended by the sealant manufacturer.
- B. Upon completion, remove and dispose of masking.

END OF SECTION

SECTION 08 00 20
DOORS AND HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Steel frames
- B. Door Hardware

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry
- B. Section 09 91 00 - Painting

1.3 REFERENCES

- A. ANSI/DHI A 115.IG - Installation Guide for Doors and Hardware.
- B. ANSI/BHMA A 156 - Specifications for Hardware Preparations in Standard Steel Doors and Frames.
- C. ANSI/BHMA A156.7 - Hinge Template Dimensions.
- D. ANSI A 250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- E. ANSI A 250.11 - Recommended Erection Instructions for Steel Frames.
- F. ANSI A156.3 - American National Standard for Exit Devices

1.4 SUBMITTALS

- A. Product Data: Manufacturer's standard details and catalog data indicating compliance with referenced standards for door hardware and all other items specified.

1.5 QUALITY ASSURANCE

- A. Supplier: Qualifications: Company specializing in furnishing the products specified for projects of similar size and scope.
- B. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience.

1.6 COORDINATION

- A. Coordinate Work with frame opening construction, door and hardware installation.
- B. Sequence installation to accommodate required door hardware.

PART 2 - PRODUCTS

2.1 DOOR HARDWARE

- A. Provide all door hardware as shown on the Drawings.

PART 3 - EXECUTION

3.1 DOOR FRAME MODIFICATION

- A. Remove, modify, and reinstall door frames as indicated on the Drawings.
- B. Set frames accurately in position; plumb, align and brace until permanent anchors are set.
- C. After modification of frames prime work areas as indicated on the Drawings.
- D. Finish coat doors and frames as indicated on the Drawings and specifications.
- E. Adjust doors for proper operation, free from binding or other defects.

3.2 DOOR HARDWARE INSTALLATION

- A. Apply hardware in accordance with hardware manufacturers' instructions using factory-provided fasteners.
- B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.

END OF SECTION

SECTION 09 91 00
PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation, priming, and painting of interior and exterior building surfaces.
- B. Applies to both shop fabrication and field construction.

1.2 RELATED REQUIREMENTS

- A. Section 05 12 10 - Structural Steel Framing and Fabrications
- B. Section 06 10 00 - Rough Carpentry
- C. Section 08 00 20 - Doors and Hardware
- D. Section 23 05 00 - Common Work Results for Mechanical

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 Technical Data Sheets for each type of paint specified and associated thinner. Include specific color for each product.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold Galvanizing: Cold application, single product galvanic coating, minimum 95% dry film solids, low VOC compliant. ZRC or approved equal.

- B. Alkyd Enamel Primer: Single component interior/exterior alkyd enamel primer, flat finish. PPG Multiprime 4160 or approved equal, color gray.
- C. Alkyd Enamel Finish Coat: Single component interior/exterior alkyd enamel, gloss finish. PPG Devguard 4308 or approved equal, color ANSI 61 Gray.
- D. Interior Fabrications Epoxy: Self-priming, two-part epoxy, minimum 80% solids, low VOC compliant. PPG Amerloc 2 VOC, Sherwin Williams 646 Macropoxy, or approved equal. Custom tint to ANSI 61 gray.

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 metal 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, the Drawings, 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 factory finished surfaces, hardware, plumbing fixtures 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 ENVIRONMENTAL CONDITIONS

- A. Apply paint only when the temperature of surfaces to be painted and the surrounding air temperatures are the manufacturer's recommended maximum and minimum allowable range.
- B. Do not apply paint in heavy dust or smoke laden atmosphere.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces.
- D. Painting may be continued during inclement weather, only if the areas and surfaces to be painted are enclosed and heated within the temperature and humidity limits specified by the paint manufacturer during application and drying periods.
- E. 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 shop 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 each particular substrate condition.
 - 2. 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 to be Cold Galvanized:
 - 1. Minimum surface preparation shall be Commercial Blast Cleaned per SSPC-SP6 unless specifically indicated otherwise. Remove all oil and grease in accordance with the Solvent Cleaning requirements outlined in this section.
 - 2. 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 Door Frames:
 - 1. Entire surface to be coated shall be solvent cleaned and freshwater rinsed.

2. New metal and areas with damaged coatings shall be cleaned to substrate by hand or power tool to SSPC-SP2 or SSPC-SP3. Surrounding intact coating shall be feathered.
- D. Preparation of Existing Fuel Tank:
1. Entire surface shall be cleaned with detergent and rinsed with hot high pressure water.
 2. Areas with damaged coatings shall be cleaned to substrate by hand or power tool to SSPC-SP2 or SSPC-SP3. Surrounding intact coating shall be feathered.
 3. Areas with intact coatings shall be abraded by hand or power tool to SSPC-SP2 or SSPC-SP3.

3.9 APPLICATION OF PAINT

- A. General:
1. Cleaned surfaces and all coats shall be inspected prior to the succeeding coat. Apply all coatings in strict accordance with the paint manufacturer's recommendations. Sufficient time shall be allowed between coats to assure thorough drying of previously applied paint.
 2. Prime all bare metal prior to applying topcoats.
 3. 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. Sand lightly between each succeeding coat.
 2. Finish doors and frames on tops, bottoms, and side edges, the same as the faces.
- C. Film Thickness:
1. Coverage is listed as total minimum dry film thickness in mils (DFT). 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. All 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 Authority.
 - 2. 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 Authority.
 - 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 Authority.
 - 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.

3.10 SHIPPING

- A. In all cases where pre-coated items are to be shipped to the jobsite, all efforts shall 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 Authority.

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 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, and the entire job left clean and acceptable to the Authority.

- 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.

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

END OF SECTION

SECTION 21 13 30
HIGH PRESSURE WATER MIST FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The work involves design, installation, testing, and certification of an automatic fire suppression system for a power generation plant. The power plant will contain four diesel engine generators as indicated.
- B. The power plant building is existing. All fire suppression system installation, testing, certification, and training will occur on site.
- C. The system is designed to provide local application protection around generators using two MAU 150 racks in parallel as indicated on the Drawings. The Authority recognizes that Marioff does not have Factory Mutual approval for the MAU 150 in local application protection. The Authority has chosen this configuration to obtain more reliable fire suppression than other options.
- D. The Work shall include but not be limited to:
 - 1. Design system in accordance with the latest adopted editions of all applicable codes and standards, manufacturer's requirements, these specifications, and the Drawings.
 - 2. Obtain a State of Alaska, Fire Marshal Plan Review Permit.
 - 3. Furnish and install a complete system.
 - 4. Program fire control panel.
 - 5. Filling and charging system.
 - 6. Acceptance testing, commissioning, and certification of completed system.
 - 7. Minimum four hours operation training with local operators and Authority.
 - 8. Operation and Maintenance Manuals including as-built drawings.

1.2 RELATED REQUIREMENTS

- A. Division 1.
- B. Division 23.
- C. Division 26.

1.3 QUALITY ASSURANCE

- A. All equipment shall be new except where specifically indicated to reuse existing. All equipment shall be listed for the intended application. The entire system shall be designed and fabricated in accordance with recognized and acceptable engineering and industry practices.
- B. Design shall be prepared by a registered mechanical engineer or technician with

minimum NICET Level 3 certification. Designer shall have an appropriate State of Alaska design permit.

- C. The Contractor shall be authorized by the fire suppression system manufacturer to furnish and install the specified system. Field installation shall be performed by technicians certified by the manufacturer to install the specified system.

1.4 REFERENCED STANDARDS:

- A. National Fire Protection Association (NFPA) 750: Standard on Water Mist Fire Protection Systems.
- B. Underwriters Laboratories (UL) UL 864 Control Units for Fire Protective Signaling Systems
- C. National Fire Protection Association (NFPA) NFPA 72 National Fire Alarm Code
- D. National Electrical Manufacturer's Association (NEMA).

1.5 SUBMITTALS

- A. Provide submittals in the manner described herein and in Division 1.
- B. Provide submittals for all products and systems described in Division 21 specifications and shown on the Drawings to demonstrate compliance with the requirements of the project. Submittal to include:
 - 1. Manufacturer, model numbers and quantity of each device.
 - 2. Manufacturer and model of control panel, including installed options.
 - 3. Calculations.
 - 4. Shop drawings shall indicate compliance with all requirements of the specifications and shall contain at a minimum:
 - a. Floor Plans and Diagrams for Wiring complete with circuit designation in accordance with Wire Schedule on the Drawings (A-B-C-D-E).
 - b. Panel and device installation details.
 - c. Bill of Materials
 - d. Installation notes and system Sequence of Operation.
- C. Based upon review comments by the Authority, issue final revised submittal including final construction drawings.
- D. Obtain a State of Alaska, Fire Marshal Plan Review Permit and submit to the Authority.
- E. Prior to testing, certification, and training, provide an Operation and Maintenance Manual. Manual to include system description, manufacturer's catalog information, programming, instructions, operations and maintenance literature, Material Safety Data Sheets (MSDS), and as-built drawings of completed system. Deliverables to include one bound copy plus a PDF format electronic file of the entire manual.

1.6 SUBSTITUTIONS

- A. All substitutions shall be noted on equipment submittals.

1.7 WARRANTY

- A. Division 1 - Closeout Requirements: Warranties.
- B. Provide a one-year manufacturer's warranty covering all materials and workmanship of all products supplied. Warranty shall commence from the date of system certification.

PART 2 - MATERIALS

2.1 FIRE SUPPRESSION AGENT

- A. A high pressure water mist fire suppression system shall be furnished, Marioff Hi-Fog or approved equal. In order for a substitution of the suppression system to be approved it must have at a minimum the following salient features:
 - 1. The system must use water mist as the sole extinguishing agent.
 - 2. The system must use high pressure (2,000 PSI nominal) nitrogen as the sole driving agent without the aid of any pumps.
 - 3. The system shall be a single pipe system utilizing stainless steel tubing not exceeding 1" outside diameter.
 - 4. The complete agent rack including all water and nitrogen storage for one zone of coverage shall not exceed the following dimensions: 4'-6" Long x 1'-4" Wide x 7'-6" High.

2.2 AGENT RACK AND WATER TANK

- A. Floor mounted racks shall be provided that contain the agent cylinders, nitrogen cylinder, and piping. Marioff Hi-Fog MAU 150 FS or approved equal.
- B. The racks shall be designed for the appropriate seismic code and shall be adequately anchored to the building structure.

2.3 FIRE CONTROL PANEL

- A. The Fire Control Panel shall be a Fike Cheetah XI-50 10-071-R1 or approved equal, and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with, supervise and control the following types of equipment used to make up the system: intelligent self-calibrating smoke and flame detectors, addressable modules, annunciators, and other system controlled devices.
- B. Basic equipment to be included with Fire Control Panel shall be main board with display and keypad, door, and hardware. Note that the existing backbox may be reused as noted on the Drawings or replaced at Contractor's preference.
- C. System Capacity and General Operation
 - 1. The control panel shall be capable of 50 intelligent/addressable devices.
 - 2. The system shall include two Class B (NFPA Style Y) programmable

Notification Appliance Circuits. It shall also include three additional programmable Form-C alarm and trouble relays rated at a minimum of 2.0 amps @ 30 VDC.

3. The system shall support up to 99 programmable EIA-485 driven relays for an overall system capacity of 301 circuits.
4. The Fire Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire system.
5. All programming or editing of the existing program in the system shall be achieved without special equipment, and without interrupting the alarm monitoring functions of the Fire Control Panel.
6. The Fire Control Panel shall provide the following features:
 - a. Automatic detect test and drift compensation to extend detector accuracy over life (smoke and flame detectors monitored and automatically calibrated)
 - b. Sensitivity Test, meeting requirements of NFPA 72, Chapter 5.
 - c. Maintenance Alert to warn of excessive smoke detector dirt or dust accumulation.
 - d. System Status Reports to display.
 - e. Positive Alarm Sequence pre-signal, meeting NFPA 72 3-8.3 requirements.
 - f. Periodic Detector Test, conducted automatically by software.
 - g. Pre-alarm for advanced fire warning.
 - h. Cross Zoning with the capability of: counting two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
 - i. Walk Test, with check for two detectors set to same address.
 - j. Adjustable delay and discharge timers.
 - k. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.
 - l. The detector software shall allow manual or automatic sensitivity adjustment.
 - m. Event history file in nonvolatile memory.
 - n. Panel to have abort option to manually prevent release of extinguishing agent.
 - o. Battery back-up in the event of normal AC power failure.
 - p. Unit to be able to release extinguishing agent in at least two independent hazard zones.

2.4 SECONDARY POWER SOURCE BATTERIES

- A. Secondary power shall be provided by 12 volt batteries. The batteries shall be sealed and shall be completely maintenance free.
- B. Batteries shall have sufficient capacity to power the fire system for not less than twenty-four hours standby operation plus 30 minutes of alarm upon a normal AC power failure. Note that this is in excess of minimum NFPA requirements.

2.5 HEAT DETECTOR

- A. UL Listed, adjustable temperature heat detector. Fike 60-1039 or approved equal. Set to activate at 135°F for normal temperature and 190°F for high temperature.

2.6 FLAME (OPTICAL) DETECTOR

- A. UL Listed, flame detectors shall be multi-spectrum, UV/Dual IR/Vis electro-optical, automatic calibrating, digital fire detectors. Honeywell FS-20X or approved equal. Install on swivel mount.

2.7 SMOKE (PHOTOELECTRIC) DETECTOR

- A. UL Listed, automatic calibrating type, photoelectric smoke detector. Detector to be addressable and provide analog signal to the control panel which may be used for maintenance of detector. Fike 63-1052 or approved equal.

2.8 ANNUNCIATORS

- A. Interior Annunciator (Alarm and Discharge) – UL Listed, Horn/strobe combination, minimum 75 candela. Gentex GEC3-24WR or approved equal.
- B. Exterior Annunciator (Alarm) - Weatherproof, UL Listed horn/strobe combination, minimum 75 candela. Gentex WGEC24-75WR or approved equal.
- C. Exterior Strobe (Discharge) - Weatherproof, UL Listed strobe, minimum 75 candela. Gentex WGES24-75WR or approved equal.

2.9 MANUAL PULL STATION

- A. UL Listed, addressable, double action, and provide visible indication that station has been operated. Fike 20-1839 or approved equal.

2.10 DEVICE MONITORING MODULES

- A. UL Listed modules designed for use with intelligent and addressable equipment as required. Fike Series 55 or approved equal.

2.11 PLACARDS

- A. Provide placards as indicated on the Mechanical Drawings.

2.12 RACEWAYS AND CONDUCTORS

- A. Route all fire suppression system wiring in separate dedicated raceways. All raceways shall be electrical metallic tubing (EMT). All raceways, junction boxes, pull boxes, and cover plates shall be painted red.
- B. All conductors shall be soft drawn copper, Type XHHW insulation; 600V and 75C

rated; gauge as indicated by service in accordance with the following schedule:

1. 120V AC Power - 12 AWG, stranded, color per station service scheme.
2. 24V DC Power, Detection, and Alarm Circuits - 14 AWG.

2.13 NOZZLES

- A. Existing nozzles shall be reused as noted on the Drawings. In the event that any nozzles are found to be damaged or missing replacement nozzles shall be open spray head type, Marioff 4S 1MC 8MB 1100 or approved equal.

2.14 PIPING

- A. Existing tubing shall be reused as noted on the Drawings. In the event that any tubing or fittings are found to be damaged Contractor shall replace with manufacturer's recommended materials. The completed agent discharge tubing installation and pressure testing shall be in accordance with manufacturer's recommendations.

2.15 SUPPORT

- A. Contractor shall furnish and install industry standard hangers for agent discharge piping, raceways, panel and all devices.

2.16 FITTINGS, VALVES, CONTROLS, AND DEVICES

- A. Contractor shall furnish and install all required fittings, valves, control devices, and accessories as required to provide the types of coverage required for each zone as indicated on the Drawings.

PART 3 - EXECUTION

3.1 DESIGN

- A. The system shall be designed and installed in accordance with the latest adopted editions of all applicable codes and standards and manufacturer's requirements.
- B. The fire suppression system shall have four zones of coverage as shown on the Drawings. Zone 1 (Generation Room) shall have alarm and suppression. Zone 2 (Control Room), Zone 3 (Parts Room), and Zone 4 (Heat Recovery Room) shall have alarm only.
- C. Provide annunciators and other devices where specifically indicated on the Drawings.
- D. Design the fire suppression system to perform the sequence of operation as specified herein.

3.2 INSTALLATION

- A. The system shall be installed in accordance with the Drawings and Specifications, the approved submittal, and all manufacturer's requirements.
- B. Contractor shall perform all work with skilled craftsmen specializing in said work with all required certifications. Install all materials in a neat, orderly, and secure

fashion, as required by these specifications, manufacturer's requirements, and commonly recognized standards of good workmanship.

3.3 TESTING AND TRAINING

- A. Contractor shall provide a minimum of two weeks' notice to the Authority prior to system testing and operator training.
- B. Upon completion of testing and certification the system shall be left with one fully charged nitrogen cylinder installed in the rack plus one fully charged spare nitrogen cylinder.

3.4 SEQUENCE OF OPERATION

- A. Zone 1 (Generation Room) shall contain two flame detectors and four high temperature heat detectors. The two flame detectors shall be cross-zoned so that any one detector will set off the alarm and shut-down the generators. Any second detector will begin a 30 second countdown to agent release. The heat detectors shall be cross-zoned in the same sequence as the flame detectors such that any two will begin a 30 second countdown to agent release. The manual "FIRE SUPPRESSION RELEASE" pull station in Zone 1 will set off the alarm, shut-down the generators, and begin a 30 second countdown to agent release when activated.
- B. Zone 2 (Control Room), Zone 3 (Parts Room), and Zone 4 (Heat Recovery Room) shall each contain one smoke detector and one normal temperature heat detector. Either detector will set off alarm and shut-down the generators. The manual "FIRE SUPPRESSION RELEASE" pull station in Zone 2 will set off the alarm, shut-down the generators, and begin a 30 second countdown to agent release when activated.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- 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. 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.
- C. In addition to general mechanical requirements this Section includes specific requirements for:
 - 1. Painting and marking.
 - 2. Valve tags, signs, and placards.
 - 3. Flashing and sealing.

1.2 RELATED REQUIREMENTS

- A. Division 1
- B. Division 21.
- C. All other Division 23 Specifications.
- D. Division 26.

1.3 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. International Building Code - IBC.
 - 2. International Fire Code - IFC.
 - 3. International Mechanical Code - IMC.
 - 4. National Fire Protection Association (NFPA) NFPA 30 and NFPA 37.
- 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 Petroleum Institute (API).
4. American Society of Mechanical Engineers (ASME).
5. American Welding Society (AWS).
6. Underwriters Laboratory (UL).

1.4 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform all work in accordance with above referenced codes and standards which are referenced to establish minimum requirements.
 1. If the Contractor observes that the Drawings 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.
- C. In addition, perform all work in accordance with the specific requirements of all Division 23 sections which follow. Wherever the specifications require higher grades of material or workmanship than required by the codes the specifications shall prevail.
- D. Perform all work in a neat and workmanlike manner using skilled craftsmen who are qualified and experienced in the specific type of work.
- E. Test all work as required by the specifications. Document all testing and submit results in accordance with specifications.
- F. Perform pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

1.5 SPECIAL CONDITIONS AND REQUIREMENTS

- A. Ensure that the appropriate safety measures are implemented and that all workers are aware of the potential hazards from electrical shock, burn, noise, rotating fans, pulleys, belts, hot piping, etc. associated with working near power generation and related equipment.

1.6 DRAWINGS, SPECIFICATIONS & SYMBOLS

- A. The Drawings and Specifications are complementary; what is shown on one is as binding as if called for in both. Do not scale the Drawings. Locations of devices, fixtures, and equipment are approximate unless dimensioned.
- B. 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 Drawings or in the specifications.

1.7 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. "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.
- C. "Install" means to set in place and connect, ready for use and in complete and properly operating finished condition, material that has been furnished.
- D. "Provide" means furnish all products, labor, sub-contracts, and appurtenances required and install to a complete and properly operating, finished condition.
- E. "Product" is a generic term which includes materials, equipment, fixtures, and any physical item used on the project.
- F. "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.
- G. "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.

1.8 SUBMITTALS – GENERAL REQUIREMENTS

- 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 with an index following specification format and with item by item identification.
- B. 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.
- C. Submittals shall demonstrate compliance with the requirements of the project. Furnish all relevant data as appropriate including but not limited to:
 - 1. Manufacturer's name and address, and supplier's name, address, and phone number.
 - 2. Catalog designation or model number with rough-in data and dimensions.
 - 3. Operation characteristics.

4. 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.
 5. Wiring diagrams for the specific system.
 6. Coordination data to check protective devices.
 7. Shop Drawings.
- D. Provide submittals for all materials and equipment in the Division 23 specification sections which follow and submit under that specification section.
- 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.

1.9 SUBMITTALS UNDER THIS SECTION

- A. Product Data: Submit manufacturers catalog literature for paint, caulking, flashing, pipe marking, and all other items specified under this Section.
- B. Valve Tags: Provide submittal for specific tags as indicated on the Schedule on Sheet M1.2.
- C. Signs and Placards: Provide submittal for signs and placards as indicated on the Schedule on Sheet M1.2.
- D. Qualifications: Under this section submit a copy of current certification for the party or parties who will perform pipe welding under all Div 23 work.

1.10 DEVICES AND EQUIPMENT

- A. Devices and equipment shall be listed for the intended service. Manufacturers or model numbers shown on the drawings or in the specifications is provided to indicate the required features. Substitutions of equivalent items will be accepted unless items specifically indicate no substitutes.
- B. Install all equipment such that the minimum required operating clearances are maintained.
- C. Protect all materials and equipment during the entire duration of construction work against contamination or damage. Replace or repair to original manufactured condition any items damaged during construction. Immediately report to the Authority any items found damaged prior to commencing construction.

1.11 RECEIVING AND HANDLING MATERIAL

- A. See General Conditions and 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.

1.12 TIMELY EXECUTION 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.

1.13 LAYOUT AND COORDINATION OF WORK

- A. Drawings are partly diagrammatic and it is not the intent to show in detail all features of work or exact physical arrangement of equipment. The locations of piping and equipment are approximate unless dimensioned. The exact locations and routing of piping shall be governed by structural conditions and physical interferences and by the location of mechanical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance.
- B. If piping is placed incorrectly with respect to equipment connections or if equipment connections are relocated without appropriate changes in the mechanical 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 portions of work by other trades is necessary.

1.14 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 compromised, 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.

1.15 PROJECT RECORD DRAWINGS

- A. In accordance with the requirements of Division 1 maintain record documents at the project site and make available for review by the Authority upon request.
- B. 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 below grade or in blind spaces within the building.
- C. At completion of project, deliver record documents in accordance with Division 1.

1.16 MECHANICAL SYSTEMS TESTING AND REPORTING REQUIREMENTS

- A. Division 1 – Quality Control
- B. Provide pressure tests of piping and tanks as indicated on the Drawings and in the Division 23 sections that follow.
- C. Notify the Authority in writing seven (7) days in advance of pressure tests. The Authority shall have the option to be present at all testing.
- D. Provide written documentation of all pressure tests. The Contractor may use their own test forms or upon request the Authority can provide forms for common tests. Test reports shall include at a minimum the following information: item or system identification, gauge pressure, air temperature, time, date, signature of person performing test, and photographs of testing in progress.
- E. Cut out or disassemble all leaking joints. Repair and re-test until system proves leak-free. Retesting after the repair of defects shall be performed at no cost to the Authority.
- F. Submit completed results of final successful tests along with photographs to the Authority for approval prior to Substantial Completion.

1.17 MECHANICAL INSTRUMENTATION CALIBRATION REQUIREMENTS

- A. Division 1 – Quality Control
- B. Calibrate all mechanical and electronic measuring devices as indicated in the Division 23 sections that follow.
- C. Devices requiring calibration shall include but not be limited to: tank level gauges, pressure vacuum whistle vents, liquid level probes, float switches, thermometers, and temperature transmitters (sensors).

1.18 SUBSTANTIAL COMPLETION

- A. In accordance with Section 01 77 00 - Contract Closeout Procedures, provide advance written notice to the Authority to schedule substantial completion inspection. Submit all required documents and ensure all conditions have been met.
- B. Provide Authority access to the site. Provide on-site transportation, ladders, lifts, etc. for inspection and testing of the work.
- C. Cooperate with the Authority and provide assistance at all times for the inspection of the mechanical 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.
- D. Conduct operating tests and demonstrate that all systems 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.
- E. Have instruments available for measuring pressure and temperature. Provide services of qualified technicians familiar with equipment and systems to assist in taking measurements and making tests.

- F. Assist the Authority in instruction of operators on the proper operation and maintenance of all systems and equipment under this contract. Provide services of qualified technicians familiar with each item or system.

1.19 FINAL COMPLETION

- A. In accordance with Section 01 77 00 - Contract Closeout Procedures, provide notification of completion. Submit all required documents and ensure all conditions have been met.

1.20 WARRANTY

- A. In accordance with Section 01 73 00 – Execution Requirements, provide warranties for all systems and equipment.
- B. See Division 23 sections that follow for specific equipment warranty requirements. Wherever the Division 23 specifications have more stringent warranty requirements than Division 1, the Division 23 requirements shall prevail.

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 shall be 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. Steel Fabrications and Tanks - Self-priming epoxy, Sherwin Williams Macropoxy 646, no substitutes, color Structural Gray 4031.
- B. Interior Carbon Steel Pipe – Primer: PPG Multiprime 4160 or approved equal, color gray. Finish: PPG Devguard 4308 or approved equal, color ANSI 61 Gray.
- C. Exterior Carbon Steel Pipe - Cold Galvanizing Compound, ZRC or approved equal.
- D. Touch Up of Zinc Plated and Galvanized Items – Cold Galvanizing Compound, ZRC or approved equal.

2.3 PIPE MARKING

- A. Black or white arrows over colored backgrounds, self-adhesive vinyl, Seton arrows on roll or approved equal. Background color scheme to match the colors listed for Specific Function Valve Tags.

2.4 FLASHING AND SEALING

- A. Caulking for Piping - Polyurethane-based sealant, Sika Sikaflex 1A, or approved equal. Color gray.
- B. Flashing - Best Materials Multi-Flash Master Flash or approved equal, Black EPDM. Note that the retro-fit style may be used for convenience.

2.5 VALVE TAGS

- A. Specific Function Valve Tags – For all valves marked with a specific function, provide tags color coded and worded as indicated on the Schedule on Sheet M1.2.
- B. Standard Valve Tags – For all valves not marked with a specific function, provide NO/NC tags as indicated on the schedules. Seton or approved equal.
- C. Install all tags as noted.

2.6 SIGNS AND DECALS

- A. Provide sign boards and decals, color coded and worded as indicated on the Schedule on Sheet M1.2. 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 other Drawings which may include electrical, architectural, structural, and civil. Coordinate work under this section with that of all related trades.
- B. Contractor shall 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 EXAMINATION

- A. Check materials for damage that may have occurred during shipment. Repair damaged materials as required or replace with new materials.

3.3 CUTTING, 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.

3.4 PAINTING

- A. Steel Fabrications and Tanks - Paint all carbon steel fabrications and tanks as indicated in fabrication details. Sandblast all exterior surfaces in accordance with SSPC-SP-6. Prime and top coat with two coats self-priming epoxy, color ANSI 61 Gray.
- B. Interior Carbon Steel Pipe - Paint all exposed carbon steel pipe and fittings that is not insulated except for engine exhaust. Wire brush and wipe down with solvent. Prime with one coat of alkyd primer and finish with one coat of alkyd enamel, color ANSI 61 Gray.

- C. Exterior Carbon Steel Pipe - Paint all exposed carbon steel pipe and fittings except for engine exhaust. Wire brush and wipe down with solvent. Prime and finish with two coats of cold galvanizing compound.
- D. Touch-up – Touch up paint on fabricated items to match original. Finish all cut ends and damaged surfaces of galvanized and zinc plated supports and fasteners with spray on cold galvanizing compound.

3.5 PIPE MARKING

- A. Install flow arrows on diesel fuel, used oil, cooling, and heat recovery piping. Confirm normal fluid flow direction and install arrows aligned with normal flow. On insulated piping install flow arrows over jackets. Background color scheme to match the colors listed for Specific Function Valve Tags.

3.6 FLASHING AND SEALING

- A. For all penetrations of interior walls and small pipe (less than 2” diameter) penetration of exterior walls, seal with polyurethane caulking all around both surfaces.
- B. For 2” diameter and larger pipe penetration of exterior walls install flashing as indicated on Drawings.
- C. Where specific details are indicated, flash and/or seal penetrations as indicated.

3.7 VALVE TAGS, SIGNS, AND PLACARDS

- A. Install tags, sign boards, and decals where indicated on the Drawings.

3.8 ANTI SEIZE

- A. Coat threads with anti-seize on all exterior bolts, stainless bolts, black bolts, and where indicated under other sections or noted on the drawings.
- B. Coat pipe flange gaskets with anti-seize prior to final assembly.
- C. Coat all piping and other connections to the top of fuel storage tanks with anti-seize.

3.9 INSTALLATION OF EQUIPMENT

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

3.10 VIBRATION ISOLATION

- A. All vibrating equipment and the interconnecting pipe and ductwork shall be isolated to eliminate the transmission of objectionable noise and vibration to 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. Structural steel shapes.
 - 2. Pipe hangers and supports.
 - 3. Formed steel channel (strut).
 - 4. Strut fittings, accessories, and straps.
 - 5. Fasteners and hanger rods.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 00 – Common Work Requirements for Mechanical
- B. Section 23 21 13 - Hydronic Piping
- C. Section 23 11 13 - Fuel and Lube Oil Piping
- D. Section 23 35 17 - Engine Exhaust Crank Vent Systems
- E. Section 26 05 29 - Hangers and Supports for Electrical Systems

1.3 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 F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
- 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.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.

- B. Shop Drawings: Submit shop drawings for fabricated supports. Note that if all items will be fabricated exactly as indicated on the Drawings, the design Drawings can be submitted in lieu of shop drawings.
- C. Product Data:
 - 1. Hangers, Supports, and Accessories: Submit manufacturers catalog data including load capacity. Indicate finish for interior and exterior applications.
 - 2. Anti-Seize: Submit manufacturers catalog data.

1.5 QUALITY ASSURANCE

- A. Division 1 – Quality Control
- B. Conform to applicable code for support of piping and equipment.

1.6 QUALIFICATIONS

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

1.7 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.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 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.

2.2 PIPE HANGERS AND SUPPORTS

- A. Support equipment and raceways on strut, brackets, trapeze hangers, or as detailed. Anvil, B-Line, Grinnell, Unistrut, or approved equal.

2.3 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 equal.

- C. Double Strut: 12 gauge thick steel, 1-5/8" x 3-1/4", B-line B22A-SH-Galv or equal.
- D. Shallow Strut: 14 gauge thick steel, 1-5/8" x 13/16", B-line B54-SH-Galv or 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.

2.4 FITTINGS, ACCESSORIES, AND STRAPS

- A. 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.
- B. U-Bolts: Provide standard u-bolts sized for the specific pipe. Plain (black) or zinc plated carbon steel except where specifically indicated as stainless steel.
- C. Pipe Clamps: Two piece pipe clamp designed to support pipe tight to strut, B-line as indicated on the Pipe/Tubing Strut Clamp Schedule on Sheet M1.1 or approved equal. On copper tubing provide copper plated carbon steel clamps with dielectric cushion insert. On interior steel piping provide zinc plated carbon steel clamps. On exterior steel piping provide hot dip galvanized clamps.
- D. Pipe Straps: Two-hole steel pipe strap. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- E. Cushion Strip: Elastomer strip to provide vibration and dielectric isolation between pipe and hangers. B-Line B1999 Vibra Cushion or approved equal.

2.5 FASTENERS AND HANGER RODS

- A. All bolts, nuts, and washers to be zinc plated carbon steel except as specifically noted otherwise.
- B. On exterior installations provide hot dip galvanized steel bolts, nuts, and washers except as specifically noted otherwise.
- C. Exhaust Flange Bolts: Plain carbon steel (black) or stainless steel bolts, nuts, and flat washers. Coat with high temperature anti-seize prior to assembly.
- D. Hanger Rods: Continuous threaded rod. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- E. Rod Anchors: Where specifically indicated on the Drawings provide wood screw by threaded rod anchors, Buildex Sammy Screws or approved equal.
- F. Provide stainless wood screws and sheet metal screws where specifically indicated on the Drawings.

2.6 ANTI SEIZE

- A. Provide marine grade anti-seize lubricant for all bolted connections and where indicated. Minimum -20F to 2400F service range, non-metallic formula, salt water resistant. Loctite LB8023 or approved equal.

2.7 FABRICATED SUPPORTS

- A. Provide steel fabrications for support of equipment and piping systems as indicated on the 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.
- B. Obtain permission from the Authority before drilling or cutting structural members.

3.2 ANTI SEIZE

- A. Coat threads with anti-seize on all exterior bolts, stainless bolts, black bolts, and where indicated under other sections or noted on the drawings.

3.3 INSTALLATION - EQUIPMENT

- A. Support equipment as shown on Drawings using specified supports and fasteners.
- B. On all bolted connections install flat washers and lock washers. Double nut connections where indicated.
- C. Anchor equipment weighing more than 100 pounds to the building structure to resist lateral earthquake forces.
- D. 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.
- E. 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.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Support piping 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. Pipe clamps and hangers for steel pipe shall be zinc plated carbon steel except on exterior installations hot dip galvanized.
- C. Copper tube shall be isolated from clamps, hangers, and strut with two layers of 10 mil vinyl pipe wrap or elastomer cushion strip.
- D. Wrap pipe or hose with elastomer cushion strip where specifically indicated and where required to provide vibration or dielectric isolation.
- E. Independently support pumps and equipment. Do not support piping from connections to equipment.
- F. Support horizontal piping as scheduled.

- G. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- H. Place hangers within 12 inches of each horizontal elbow or as indicated.
- I. Use hangers with 1-1/2 inch minimum vertical adjustment.
- J. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- K. Support riser piping independently of connected horizontal piping.
- L. Design hangers for pipe movement without disengagement of supported pipe.
- M. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 23 07 19.

3.5 SCHEDULES - PIPE HANGERS AND SUPPORTS

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 & 5	12	10	1/2	5/8

END OF SECTION

SECTION 23 07 19
PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Piping and equipment insulation, jackets, and accessories.

1.2 RELATED REQUIREMENTS

- 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 21 13 - Hydronic Piping.
- D. Section 23 35 17 - Engine Exhaust Crank Vent Systems.

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 under this Section in accordance with 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.

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 HYDRONIC (COOLANT/HEAT RECOVERY) PIPE INSULATION

- A. TYPE P-1: ASTM C547, 1” preformed rigid fiberglass pipe insulation. Thermal Conductivity: 0.23 at 75 degrees F. Operating Temperature Range: 0 to 850 degrees F. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints. Jacket Temperature Limit: minus 20 to 150 degrees F. Johns-Manville “Micro-Lok” or approved equal.

2.2 EXHAUST PIPE INSULATION

- A. Pipe: 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 Tecton 1200 or approved equal.

2.3 PIPE INSULATION JACKETS

- A. ASTM B209 exterior grade aluminum, 0.016 inch thick sheet, embossed finish roll stock for straight pipe. Pre-formed aluminum covers for elbows and tees. Provide wing seal band closures.

2.4 EXHAUST FLEX BLANKET INSULATION

- A. Insulate engine exhaust flex connectors from turbo outlet up to and including flanged end with custom fit high temperature thermal insulation blanket. Provide four layer system with inner stainless steel mesh, 2000°F ceramic blanket, 1000°F fiberglass blanket, and plain weave caramelized fiberglass fabric outer cover. Provide all stainless steel closure system including lacing anchors, washers, and wire. Distribution International or approved equal.

2.5 HEAT EXCHANGER INSULATION

- A. ASTM C612, 1” preformed rigid fiberglass board type insulation with FSK foil facing one side. Johns-Manville Spin Glas 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.
- B. Verify piping has been tested and all flange bolts have been torqued 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 – HYDRONIC AND EXHAUST PIPE

- A. Install insulation where indicated on Drawings.
- B. Install pipe insulation in accordance with manufacturer’s installation instructions.
- C. Cover all hydronic (coolant/heat recovery) and exhaust piping insulation with aluminum jackets. Provide longitudinal slip joints with minimum 2 inch laps. Overlap circumferential joints 2” minimum. Secure with wing seal bands at each circumferential joint and between joints at 12” on center maximum.

3.3 INSTALLATION - EXHAUST FLEX

- A. Install engine exhaust flex blanket insulation to completely cover flex from turbo outlet up to and including flanged end. Lace up tight with stainless steel wire.

3.4 INSTALLATION - HEAT EXCHANGER INSULATION

- A. Cover all faces of heat exchanger with 1” preformed rigid fiberglass board type insulation. Cut insulation to fit tight all around.
- B. Seal all edges, joints, and corners with reinforced foil tape.

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 gauges.
 - 3. Differential pressure gauges.
 - 4. Thermometers and thermowells.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 00 - Common Work Requirements for Mechanical.
- B. Section 23 21 16 - Hydronic Equipment and Specialties.
- C. Division 26 - Electrical

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
- B. ASTM International:
 - 1. ASTM E1 - Standard Specification for ASTM Thermometers.
 - 2. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturers catalog literature for all instrumentation items specified herein.
 - 2. Submit manufacturers catalog literature for each item indicated on the Instrumentation Equipment Schedule on Sheet M1.1.

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 controls on site in original factory packaging. Inspect for damage.

1.7 COORDINATION

- A. Coordinate installation of control components with work of Division 26.

PART 2 PRODUCTS

2.1 PRESSURE GAUGES

- A. Dry type stainless steel case, tube, and socket, 1/4" NPT bottom connection, 2-1/2" dial size. Range as indicated on Drawings.
- B. Range 0-30 psi: Trerice Model 700SS-25-02-L-A-30 or approved equal.
- C. Range 0-100 psi: Trerice Model 700SS-25-02-L-A-100 or approved equal.

2.2 DIFFERENTIAL PRESSURE GAUGES

- A. Diaphragm type, brass body, 1/4" FPT in-line connections, 2-1/2" size basic dial, hermetically sealed SPDT switch with terminal strip.
- B. 0-15 PSI Range: Orange Research 1516DGS-1E-2.5B-C-0-15PSID or approved equal.

2.3 THERMOMETERS

- A. Digital thermometer, solar powered, LCD display, -50 to +300 F range or dual F/C range, 1% of reading accuracy, variable angle display, 3-1/2" stem length.
- B. Weiss DVU35 or approved equal.
- C. Provide all thermometers with a 3/4" NPT brass thermowell.

2.4 ELECTRICAL/ELECTRONIC INSTRUMENTATION

- A. Provide instrumentation devices as indicated in the Instrumentation Schedule on Sheet M1.1.

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 systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Install instrumentation where indicated on the Drawings in accordance with details and manufacturer's installation instructions.
- B. Install gauges and thermometers in locations where they are clear of valve handles or other obstructions and where they can be easily read from normal operating level. Install with face within 45 degrees of vertical.
- C. Adjust gauges and thermometers to final angle, and clean faces.

- D. Isolate hydronic pressure gauges during pressure testing.
- E. Install conduit and electrical wiring in accordance with Division 26.

3.3 TESTING AND CALIBRATION – TEMPERATURE DEVICES

- A. Provide a precision temperature measurement device that has been shop calibrated for use in field calibration of all thermometers and temperature sensors.
- B. All thermometers and temperature sensors shall be calibrated within +/- 0.2°F of actual temperature using the precision temperature measurement device. Verify calibration by comparing readings of adjacent thermometers and temperature sensors.
- C. Calibrate digital thermometers and digital thermometer/temperature transmitters using the internal control potentiometer.
- D. Calibrate piping temperature transmitters (TT) using scaling and offset on the switchgear PLC.
- E. With heat recovery system circulating, read heat recovery return temperature from pump CIM card (318 Fluid Temperature) and compare to thermometer.
- F. Calibrate radiator temperature transmitters (TT) using scaling and offset on the switchgear variable frequency drives (VFD).
- G. Calibrate engine exhaust temperature RTD's using scaling and offset on the switchgear Easygens.

3.4 TESTING AND CALIBRATION – MISCELLANEOUS DEVICES

- A. Provide a shop calibrated pressure gauge for use in field calibration of all pressure measuring devices. All pressure gauges and pressure/vacuum instruments shall be calibrated within +/- 5% of actual pressure.
- B. Provide a tape or gauging rod for use in field calibration of all liquid levels. All liquid level gauges and probes shall be calibrated within +/- 0.25" of actual level.
- C. Calibrate cooling system and heat recovery piping pressure transmitter (PTC and PTH) using scaling and offset on the switchgear PLC.
- D. Calibrate glycol level sensor (GLS) using scaling and offset on the switchgear PLC.
- E. Set heat recovery pumps to speeds or control modes as indicated on the Drawings. With heat recovery system circulating, read flow rate from pump CIM card (312 Flow) and compare to design value. Cycle pump on and off and throttle discharge valve to confirm proper operation.

END OF SECTION

SECTION 23 11 13
POWER PLANT FUEL-OIL PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all diesel fuel and lube oil piping systems installed above grade at the power plant including interior and exterior piping.
- B. Section includes:
 - 1. Fuel oil piping.
 - 2. Lube oil (used oil) piping.
 - 3. Fittings, Valves, and Strainers.

1.2 RELATED REQUIREMENTS

- 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 – Power Plant Fuel-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.

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 or equipment.
- C. Provide pipe hangers and supports per Drawings and Specifications.

1.6 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data: Provide submittals for all products and systems described herein.

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 pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

1.8 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.

1.9 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 leave in place until installation.

1.10 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.
- B. Oil pipe shall have welded joints except for threaded connections to equipment and valves as required and shown. Provide flanged joints where indicated on Drawings to allow removal of individual components.
- C. Provide butt weld joints for all pipe 2 inches in diameter and larger and on smaller pipe where specifically indicated on Drawings. Provide socket weld or threaded joints for all piping smaller than 2 inches in diameter unless indicated otherwise.

- D. Vent piping shall be galvanized pipe with threaded joints.

2.2 PIPE

- A. Oil Pipe (DFS, DFR, UOR): 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. Fittings: ASTM A234 seamless carbon steel butt weld fittings for all pipe 2 inches in diameter and larger and on smaller pipe where specifically indicated on Drawings. Provide socket weld or threaded joints for all piping smaller than 2 inches in diameter using ASTM 105, forged steel fittings, minimum 3000 lb.
- B. Flanges: ASTM A105 forged steel, ANSI 150# raised face unless indicated otherwise. Butt or socket weld as indicated.
- C. Flange Gaskets: Spiral wound metallic gaskets, Flexitallic CG or approved equal.
- D. Flange Bolts: On all exterior piping provide galvanized bolts, nuts, and washers. On interior piping provide zinc plated or galvanized bolts, nuts, and washers.
- E. Vent pipe shall have threaded joints with minimum 300# galvanized threaded fittings.

2.4 BALL VALVES

- A. Flanged Ball Valves: Carbon steel body, unibody style with reduced port, ANSI 150# raised face flanged ends, stainless steel ball and trim, PTFE seat and seals for NACE MR0175 service, 150 psig minimum working pressure, with lockable handle. Keckley Style BVF1 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 or Nibco.
- B. Threaded Ball Valves: Carbon steel body, seal welded full port body, FPT ends, stainless steel ball and trim, PTFE seat and seals for NACE MR0175 service, 150 psig minimum working pressure, with lockable handle. Keckley Style BVS2 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 or Nibco.

2.5 CHECK VALVES

- A. Threaded Check Valves: Brass or bronze body, threaded ends, swing check style, 150 psig minimum working pressure. Domestic only. Hammond, Milwaukee, Nibco, 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 Drawings, Kingston 103SS or approved equal.

2.7 FUSIBLE VALVES

- A. Fusible Link Valves: Brass body, FPT ends, 165°F fusible head. Beckett Firomatic or approved equal. Size as indicated on Drawings:
1/2" Valve Model #12130
1" Valve Model #12113.

2.8 SOLENOID VALVES

- A. Normally Closed Solenoid Valves: Brass body, 1/2" FPT ends, 1/2" NPT conduit connection, 120VAC, stainless steel core, molded epoxy coil enclosure, internal pilot operated, 150 PSI differential opening pressure, liquid tight and full modulation at 0 PSI differential. Asco Catalog No. 8210G94 or approved equal.
- B. Normally Open Solenoid Valves: Brass body, 1/2" FPT ends, 1/2" NPT conduit connection, 120VAC, stainless steel core, molded epoxy coil enclosure, internal pilot operated, 150 PSI differential closing pressure, liquid tight and full modulation at 0 PSI differential. Asco Catalog No. 8210G34 or approved equal.

2.9 STRAINERS

- A. Threaded Y Strainer: Type Y pattern, bronze body, screwed ends, gasketed cap, 20 mesh stainless steel screen. 200 psig minimum working pressure. Mueller No. 351 or approved equal.
- B. Flanged Basket Strainer: Basket type, carbon steel body, ANSI 150# raised face flanged ends 150 PSIG working pressure, quick knob top with O-ring, 0.062 mesh stainless steel screen. Mueller #125F-CS 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 and remove burrs. Remove scale and dirt, on inside and outside, before assembly.
- B. Thoroughly coat male pipe ends with Teflon tape and Teflon pipe joint compound prior to assembling.
- C. Coat flange gaskets and bolts with anti-seize compound prior to assembling joints.

3.3 INSTALLATION - PIPING

- A. Route piping in orderly manner and maintain gradient.
- B. Install pipe hangers and supports in accordance with Drawings and Section 23 05 29.
- C. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.

- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Install valves with stems upright or horizontal, not inverted. Provide access where valves are not exposed.
- F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. Seal wall penetrations as indicated on the Drawings.
- H. Prepare and paint pipe, fittings, supports, and accessories not pre-finished in accordance with Section 23 05 00.
- I. Install identification on piping systems in accordance with Section 23 05 00.

3.4 FUEL AND LUBE OIL PIPING TESTING AND REPORTING

- A. Division 1 – Quality Control
- B. Provide notification and reporting in accordance with Section 23 05 00 – Common Work Requirements for Mechanical.
- C. Test all oil piping with minimum 100 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 items.
- D. Pressure test piping system again after all equipment is installed for a minimum of one hour at 50 psi or the maximum rated pressure of the weakest component, whichever is less.

3.5 SYSTEM STARTUP

- A. Prime equipment and piping prior to testing and verify operation as indicated in Section 23 12 13.

END OF SECTION

SECTION 23 12 13
POWER PLANT FUEL-OIL EQUIPMENT AND SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all fuel and lube oil piping systems.
- B. Section Includes:
 - 1. Fuel and Lube Oil System Equipment.
 - 2. Day Tank, Hopper, and Filter.
 - 3. Hoses and Flexible Connectors.

1.2 RELATED REQUIREMENTS

- 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 - Power Plant Fuel-Oil Piping.
- D. Division 26 - Electrical.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturers catalog literature for all items specified herein.
 - 2. Submit manufacturers catalog literature for each item indicated on the Fuel System Equipment Schedule on Sheet M1.1.
- C. Shop Drawings: Submit shop drawings for fabrication of day tank, hopper, and filter bank. Note that if all items will be fabricated exactly as indicated on the Drawings, the design Drawings can be submitted in lieu of shop drawings

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, gauges, filters, equipment, and appurtenances as indicated in the Fuel System Equipment Schedule on Sheet M1.1.
- B. Filter: Provide spare filter elements, type and quantity as indicated in the Fuel System Equipment Schedule on Sheet M1.1.

2.2 DAY TANK, HOPPER, AND FILTER BANK

- A. Day Tank: Rectangular heavy gauge welded steel tank, capacity and configuration as indicated, manufactured in accordance with UL standard 142 and Drawings. Furnish and install all accessories as indicated.
- B. Hopper: Welded steel assembly manufactured as shown on Drawings. Furnish and install all accessories as indicated.
- C. Filter Bank: Welded steel assembly manufactured as shown on Drawings. Furnish and install all accessories as indicated.

2.3 HOSES

- A. Fuel rated hose, Eaton Weatherhead H569, Aeroquip FC300, or approved equal. Sized as indicated on Drawings. Provide re-useable plated steel straight JIC swivel ends with NPT adapters.

2.4 VENT CAP

- A. Vent: Aluminum body, stainless steel screen, FPT connection, size as indicated. Morrison Figure 155 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.

3.2 PREPARATION

- A. Protect bright finished shafts, bearing housings, and similar items until in service. No rust will be permitted.

3.3 FABRICATED TANKS TESTING AND REPORTING

- A. Division 1 – Quality Control.
- B. Provide notification and reporting in accordance with Section 23 05 00 – Common Work Requirements for Mechanical.
- C. Pressure test all tanks as indicated on the tank fabrication drawings.

3.4 INSTALLATION

- A. Install pumps and associated equipment in accordance with Drawings and

manufacturer's installation instructions.

- B. Install fuel oil day tank, hopper, and filter bank as indicated on Drawings.
- C. Install replaceable hose end fittings in accordance with manufacturer's installation instructions. Lubricate hose ends prior to assembly. Verify that internal passage is clear of any obstructions.
- D. Electrical installation shall be in accordance with Division 26 Specifications.
- E. Prior to installing float switches in tanks verify operation for correct orientation (NO/NC) and actuation height.

3.5 SYSTEM STARTUP

- A. Prior to starting fuel and oil pumps remove suction hoses from inlet connections, prime pump cavities with lube oil, then energize momentarily to verify proper rotation.
- B. Manually open actuated ball valve and use hand pump to prime piping into day tank. Prime all piping and fill all filters with diesel fuel then bleed off air prior to starting pumps.
- C. Verify operation of all day tank and blender controls including timers and level alarms.
- D. Upon initial fill of tanks, calibrate manual level gauges and level sensing probes using tape or gauging rod. See Section 23 09 00 - Instrumentation.

END OF SECTION

SECTION 23 21 13
HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all hydronic (glycol) piping systems.
- B. Section includes:
 - 1. Coolant (engine cooling) piping.
 - 2. Heat recovery piping.
 - 3. Pipe fittings.
 - 4. Valves and strainers.
 - 5. Engine coolant (ethylene glycol).

1.2 RELATED REQUIREMENTS

- 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 23 21 16 - Hydronic Equipment and Specialties.
- E. 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.

1.4 SYSTEM DESCRIPTION

- A. Provide piping system types as indicated on the Drawings.
- B. Where copper tubing connects to steel piping provide connections as detailed on Drawings using bronze or brass fittings or valves for transition.
- C. Provide flanges, unions, and couplings at locations requiring servicing. Install unions, flanges, and couplings downstream of valves and at equipment connections.
- D. Provide pipe hangers and supports in accordance with Drawings and specifications.
- E. Use ball valves or butterfly valves for shut-off and to isolate equipment where indicated.
- F. Use gauge cock isolation valves to isolate instrumentation and small devices where indicated.
- G. Use hose end drain valves with cap for drains and air purge vents where indicated.
- H. Flexible Connections: Use flexible connectors and hoses where indicated.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories.
 - 2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
 - 3. Glycol: Submit manufacturers catalog information for ethylene glycol solution for engine cooling service.

1.6 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.
- C. Perform pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

1.7 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.

1.8 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 leave in place until installation.
- C. Store glycol solution in sealed containers clearly marked by product type.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 COOLANT PIPING

- A. See Drawings for delineation of steel and copper piping systems.
- B. Steel Piping: Provide schedule 40 ASTM A106B, seamless black steel pipe with butt weld joints for engine cooling piping as specifically indicated on the Drawings.
 - 1. Fittings: ASTM A234 seamless carbon steel butt weld fittings for all pipe 2 inches in diameter and larger and on smaller pipe where specifically indicated on Drawings. Provide ASTM 105, forged steel fittings, minimum 3000 lb. socket weld or threaded fittings for pipe smaller than 2 inches and for connections as indicated.
 - 2. Flanges: ASTM A105 forged steel, ANSI 150# flat face unless indicated otherwise. Butt or socket weld as indicated.
 - 3. Flange Gaskets: Spiral wound metallic gaskets, Flexitallic CG or approved equal.
 - 4. Flange Bolts: On all exterior piping provide galvanized bolts, nuts, and washers. On interior piping provide zinc plated or galvanized bolts, nuts, and washers.
 - 5. Unions: ASTM A105 forged steel threaded unions, Class 3000 minimum.
- C. Rigid Copper Piping: Provide ASTM B88, Type L drawn copper tubing with solder or threaded joints for engine cooling piping as specifically indicated on the Drawings.
 - 1. Fittings: ASME B16.22 solder wrought copper, ASME B16.18 solder cast copper or ASME B16.15 threaded cast bronze.
 - 2. Joints: soldered with 95-5 tin-antimony solder or silver solder except on tee drill connections use brazing rod for copper tubing.
 - 3. Flanges: Provide ANSI 150# companion flanges for transition to steel piping or flanged valves and equipment. Flanges to be two-piece with powder coated steel flange and solder copper tube adapter, Nibco 672 or approved equal.
 - 4. Flange Gaskets: Spiral wound metallic gaskets, Flexitallic or approved equal.
 - 5. Flange Bolts: On all exterior piping provide galvanized bolts, nuts, and washers. Bolts, nuts, and washers on interior piping may be zinc plated.
 - 6. Unions: Bronze unions with solder ends except where specifically indicated as threaded.
- D. Soft Copper Piping: Provide Type K soft drawn copper tubing with ASME B16.26 flared tubing cast copper fittings and flare nuts as specifically indicated on drawings.

2.2 HEAT RECOVERY PIPING

- A. Provide ASTM B88, Type L drawn copper tubing with solder or threaded joints.
 - 1. Fittings: ASME B16.22 solder wrought copper or ASME B16.15 cast bronze threaded fittings.
 - 2. Joints: soldered with 95-5 tin-antimony solder or silver solder except on tee drill connections use brazing rod for copper tubing.
 - 3. Flanges: Provide ANSI 150# companion flanges for transition to steel piping or flanged valves and equipment. Flanges to be two-piece with powder coated steel flange and solder copper tube adapter, Nibco 672 or approved equal.
 - 4. Flange Gaskets: Spiral wound metallic gaskets, Flexitallic or approved equal.
 - 5. Flange Bolts: On all exterior piping provide galvanized bolts, nuts, and washers. Bolts, nuts, and washers on interior piping may be zinc plated.
 - 6. Unions: Bronze unions with solder ends except where specifically indicated as threaded.

2.3 BUTTERFLY VALVES FOR COOLANT PIPING

- A. ANSI 150# flange pattern ends, double offset disc and stem design, carbon steel body, stainless steel disc and stem, PTFE seat with silicone rubber energizer, locking handle. Bray High Performance Series 41-11001466 or approved equal.

2.4 BALL VALVES

- A. Threaded or soldered end as indicated and required, bronze body, chrome plated bronze or brass ball, full port, TFE or Viton packing and seat ring, minimum 200 psig WOG rating. Domestic only. Apollo, Hammond, Milwaukee, Nibco, or approved equal. Note that the hydronic system is not exposed to potable water; therefore, lead-free valves are not required.

2.5 CHECK VALVES

- A. Threaded or soldered end as indicated and required, bronze body, swing check style, minimum 200 psig WOG rating. Domestic only. Hammond, Milwaukee, Nibco, or approved equal. Note that the hydronic system is not exposed to potable water; therefore, lead-free valves are not required.

2.6 DRAIN VALVES

- A. Bronze body, 1/2" or 3/4" size and solder cup or MPT connection to match associated pipe connection, 3/4" male hose end with cap and jack chain. FNW 426D, 426F, 427D, or 427F or approved equal.

2.7 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.

2.8 STRAINERS

- A. Type Y pattern, bronze body, solder ends, gasketed cap, 20 mesh stainless steel screen. 200 psig minimum working pressure, Mueller No. 358S or approved equal.

2.9 PRESSURE RELIEF VALVES

- A. Threaded ends, bronze body, nonferrous internal components, 3/4" NPT connections, 500 MBH minimum capacity, set point as indicated on Drawings, ASME certified and labeled. Watts 174A or approved equal.

2.10 AUTOMATIC AIR VENT

- A. Brass body, self-closing float operated valve, screw on cap, 1/4" NPT connection. Maid-O-Mist Auto Air Vent No. 71 or equal.

2.11 ENGINE COOLANT (ETHYLENE GLYCOL)

- A. Glycol Solution for Engine Cooling Service: The glycol shall be extended life (heavy duty) ethylene glycol, Shell Rotella ELC, Chevron Delo ELC, or approved equal. Note that standard life coolant will not be accepted.
- B. The solution shall be premixed to a ratio of 50% ethylene glycol to 50% water. The water shall be treated in accordance with glycol manufacturer's recommendations. The mixed solution shall be **dyed bright pink or light red**, no exceptions.
- C. The solution shall be packaged in sealed 55 gallon drums and labeled "Ethylene Glycol" with red lettering.
- D. Furnish a minimum of 4 each 55 gallon drums of ethylene glycol solution.

2.12 HEAT RECOVERY FLUID (PROPYLENE GLYCOL)

- A. Note that the glycol solution for heat recovery service to the adjacent water plant is the same propylene glycol used in the water plant boiler system.
- B. As part of the water plant project, the existing arctic pipe and heat recovery system beyond the power plant has been charged with propylene glycol solution. Additional glycol for charging the new work in the power plant has been furnished by the water plant contractor and is located in the water plant boiler room.
- C. Propylene glycol solution does not need to be furnished for this project.

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 pipe ends and remove burrs. Remove scale and dirt, on inside and outside, before assembly.
- B. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

- C. On copper tube and solder fittings mechanically clean to bright metal and flux prior to assembling.
- D. On threaded pipe and fittings thoroughly coat male threads with Teflon tape and Teflon based pipe joint compound prior to assembling.
- E. Coat flange gaskets and bolts with anti-seize compound prior to assembling joints.

3.3 INSTALLATION

- A. Route piping in orderly manner and slope to drain at low points and vent at high points.
- B. Install pipe hangers and supports in accordance with Section 23 05 29.
- C. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Install valves with stems upright or horizontal, not inverted. Provide access where valves are not exposed.
- F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. Seal all interior wall penetrations as indicated on the Drawings.
- H. Prepare and paint piping, supports, and accessories not pre-finished in accordance with Section 23 05 00.
- I. Insulate piping in accordance with Section 23 07 19.
- J. Install identification on piping systems in accordance with Section 23 05 00.

3.4 HYDRONIC PIPING TESTING AND REPORTING - GENERAL

- A. Division 1 – Quality Control
- B. Provide notification and reporting in accordance with Section 23 05 00 – Common Work Requirements for Mechanical.

3.5 COOLANT PIPING TESTING

- A. This applies only to all piping and equipment as indicated in the engine cooling system as shown on the cooling system piping isometric.
- B. Isolate engines, radiators, expansion tank, and pressure gauges prior to pressure testing. Note that a temporary pipe cap may be required for the expansion tank. Hydrostatically test all piping at 50 psig minimum for one hour with no noticeable water leaks or pressure drops except as caused by temperature change. Alternately, piping may be tested with 50 psig air and with each joint visually inspected for leaks using a foaming soapy water solution.
- C. Relieve pressure then open all valves and remove any temporary isolation connections. Remove expansion tank cap and install temporary plug. Pressurize the

entire system with 15 psig air and visually inspect each joint, including hose and appurtenance connections, using a foaming soapy water solution.

- D. Repeat tests as required until the entire system is demonstrated to be leak free.

3.6 COOLANT SYSTEM FLUSHING

- A. Provide temporary plate type strainers, Hellan TP, Hendrix TF, or equal. Install a strainer on the inlet to each radiator.
- B. Fill the entire system with potable water and flush. Open the thermostatic valve bypass. Using a load bank, run all engines long enough with adequate load to get thermostats open and to circulate water through all piping and accessories. To ensure engines are not damaged, do not run under high load or for extended periods of time with potable water.
- C. Drain system completely. Remove temporary strainers and clean out all debris from inside pipe in vicinity of strainer.

3.7 COOLANT SYSTEM FILLING

- A. After pressure testing and flushing, fill entire system with ethylene glycol solution. Perform all functional testing of the power plant required by the Contract Documents. Ensure that engines are operated long enough with adequate load to get thermostats fully open and to circulate glycol through all piping and accessories.
- B. After the system is up to normal operating temperature verify the glycol level in expansion tank is between 1/2 and 2/3 and the pressure at the hand glycol fill pump is between 8 and 10 psig visually inspect each joint, including hose and appurtenance connections.
- C. Verify proper function of all instrumentation and calibrate all devices.
- D. Verify fluid level and temperature readings on switchgear SCADA system.
- E. Store any excess ethylene glycol solution in the original drums sealed for long-term storage. Verify that drums are clearly labeled "Ethylene Glycol" with pink lettering.

3.8 HEAT RECOVERY INTERIOR PIPING TESTING

- A. This applies to all interior heat recovery piping in the power plant.
- B. Isolate pressure gauges, pressure relief valves, and arctic pipe prior to pressure testing interior piping.
- C. 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. Alternately, piping may be tested with 100 psig air and with each joint visually inspected for leaks using a foaming soapy water solution.
- D. Flush interior piping and equipment with potable water and drain or blow out with air to remove all water. Install temporary pipe or hose jumpers as required.

3.9 HEAT RECOVERY SYSTEM FILLING

- A. After all pressure testing is successfully completed and the new interior piping system has been flushed, go to the water treatment plant and verify that the heat recovery

piping system is up to 30 psig minimum, the glycol makeup tank has a minimum of 30 gallons of glycol, and that the automatic glycol makeup pump is operating.

- B. Go to the power plant and slowly open one butterfly valve on the arctic pipe to fill and pressurize the new piping. Ensure that the glycol make up pumps is keeping up with the pipe fill so that the system maintains minimum 25 psig. Bleed air from high points. Open the other butterfly valve on the arctic pipe and bleed air from high points again.
- C. Turn on pump P-HR1B and set to operating parameter indicated on the Drawings. Verify that fluid circulates through the arctic pipe loop. Cycle pump on and off and vent high points until all air has been purged from the piping. Verify that the system is at that the system is at 25 psig minimum.
- D. Operate control room and parts room heating pumps to ensure the piping is fully charged with glycol and purged of air.
- E. With engine(s) running and the glycol cooling piping up to normal temperature, turn on pump P-HR1A and set to operating parameter indicated on the Drawings. Monitor system as the heat recovery piping heats up.
- F. When the system comes up to normal temperature (170°F minimum) run glycol make up pump to add propylene glycol solution as required to bring system pressure to 30 psig minimum at expansion tank in the water plant.
- G. Verify proper function of all instrumentation and calibrate all devices.
- H. Perform complete functional testing of the heat recovery system including energy meters and control panels. Verify readings on switchgear SCADA system.
- I. After 24 hours minimum of operation with glycol, turn off pumps, isolate and drain the piping strainer in the power plant, clean screen and reinstall, replace glycol, and turn pumps back on. Check for leaks and add propylene glycol solution as required to bring system pressure to 30 psig minimum at expansion tank.

END OF SECTION

SECTION 23 21 16
HYDRONIC EQUIPMENT AND SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all hydronic (glycol) piping systems.
- B. Section includes:
 - 1. Engine Cooling System Equipment.
 - 2. Heat Recovery and Plant Heating Equipment.
 - 3. Expansion tank sight gauge and cap.
 - 4. Hoses.

1.2 RELATED REQUIREMENTS

- 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 21 13 - Hydronic Piping.
- D. Division 26 - Electrical.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with 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 Engine Cooling System, Plant Heating, and Heat Recovery Equipment Schedules on Sheet M1.1.
 - 2. Submit manufacturer's catalog information for appurtenances, hoses, hose clamps, and all other items specified herein.
- C. Shop Drawings: Submit shop drawings for glycol expansion tank fabrication. Note that if the tank will be fabricated exactly as indicated on the Drawings, the design Drawings can be submitted in lieu of shop drawings.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Installer: Company specializing in performing Work of this section.

1.5 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.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements before fabrication.

PART 2 - PRODUCTS

2.1 COOLING SYSTEM EQUIPMENT

- A. Provide all equipment and accessories as indicated in the Engine Cooling System Equipment Schedule on Sheet M1.1.

2.2 PLANT HEATING EQUIPMENT

- A. Provide all equipment and accessories as indicated in the Plant Heating Equipment Schedule on Sheet M1.1.

2.3 HEAT RECOVERY SYSTEM EQUIPMENT

- A. Provide all equipment and accessories as indicated in the Heat Recovery System Equipment Schedule on Sheet M1.1.

2.4 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.

2.5 EXPANSION TANK CAP

- A. Cap: Heavy duty radiator cap for pressurized reservoir, 10 PSIG, MotoRad Model 1004-10 or approved equal.
- B. Adapter: Fabricated aluminum adapter for pressurized reservoir cap, 2" MPT, Tri-Jet 2NPT-RCA or approved equal.

2.6 HOSES

- A. Engine Coolant Connections: Wire reinforced corrugated silicone hose. Flexfab 5508, Tusil Radflex, CRP Industries 9200, or approved equal. Size as indicated on the Drawings.
- B. Coolant Hand Pump Connections: Heavy duty oil resistant PVC suction hose. Tigerflex ORV or approved equal. Size as indicated on the Drawings.
- C. Expansion Tank Vent Discharge: Nylon reinforced silicone heater hose, Flexfab 5526 or approved equal. Size as indicated on the Drawings.
- D. Terminations: Provide barbed hose (king) nipples, brass for connection to copper or bronze fittings, carbon steel for connection to steel piping.

- E. Hose Clamps: On hoses larger than 1” size install stainless steel T-bolt clamps, Ideal-Tridon 30051 or approved equal. On hoses 1” and smaller install lined stainless steel constant torque clamps, Ideal-Tridon 47 or approved equal.

2.7 FABRICATED TANKS

- A. Glycol Expansion Tank - Provide fabricated steel tank manufactured as shown on Drawings. Furnish and install all accessories as indicated.

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 FABRICATED TANKS TESTING AND REPORTING

- A. Division 1 – Quality Control.
- B. Provide notification and reporting in accordance with Section 23 05 00 – Common Work Requirements for Mechanical.
- C. Pressure test all tanks as indicated on the tank fabrication drawings.

3.4 INSTALLATION

- A. Install equipment and accessories in strict compliance with manufacturer’s instructions.
- B. Install piping system and appurtenances as indicated on Drawings.
- C. Terminate hoses on barbed (king) nipples with specified clamps.

3.5 SYSTEM STARTUP

- A. Clean and flush glycol piping systems before adding glycol solution. See Section 23 21 13 - Hydronic Piping.
- B. Upon initial fill of tanks, calibrate manual level gauges and level sensing probes. See Section 23 09 00 - Instrumentation.
- C. Once systems are in operation and up to normal operating temperatures, calibrate thermometers and temperature sensors. See Section 23 09 00 - Instrumentation.

END OF SECTION

SECTION 23 24 14 GLYCOL RADIATORS

PART 1 - GENERAL

1.1 SCOPE

- A. The Work included herein shall consist of providing liquid glycol coolers (radiators) for diesel engines as specified herein.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 00 - Common Work Requirements for Mechanical.
- B. Section 23 21 13 - Hydronic Piping.

1.3 SUBMITTALS

- A. Submit manufacturers shop drawings and calculation sheets for the radiators specified herein.
- B. Prior to shipment, submit manufacturer's quality control reports with record of bolt torque confirmation, pressure testing, and other quality control checks. All test reports shall be signed and dated.
- C. Provide all submittals in Adobe Acrobat PDF format.

1.4 QUALIFICATIONS

- A. Company specializing in manufacturing products specified in this section.

PART 2 - PRODUCTS

2.1 RADIATOR - GENERAL

- A. The basis of design is L&M Radiator Mesabi, specific model as indicated. The power plant supports and piping are configured for this product. In order for a substitute to be approved as equal it must be dimensionally equivalent and must meet all other requirements specified herein.
- B. The radiators shall be configured with a vertical core, size as indicated by model. Piping connections shall be ANSI 125# pattern flanges oriented and dimensioned as indicated. The radiators shall include expanded metal core guards and wire cage fan guards.
- C. The radiator frames and tanks shall be fabricated from carbon steel and shall be coated to L&M procedure SP108 including acid etch and minimum two coats of industrial alkyd paint.
- D. The radiators cores shall be configured with field replaceable individual tubes made from copper. The tubes shall seal to the tanks with flexible rubber seals rated for minimum 220F glycol service.
- E. The radiator fans shall be propeller type direct mounted to the motor shaft. The radiator fan motors shall be 460 V, 3 PH suitable for VFD operation at a 10:1

turndown ratio, horsepower as indicated by model. Baldor, Century, Weg, or approved equal. Lubricate bearings with extreme temperature grease suitable for operation at -50C, Mobiltemp SHC32 or approved equal.

2.2 RADIATOR -SPECIFIC MODELS

- A. Mesabi Part# 123563: Vertical top inlet and horizontal bottom outlet ANSI 3” flanged connections. Minimum 15,000 BTU/minute capacity at 80°F ambient air temperature with 125 GPM flow of 50% ethylene glycol at 200F inlet, 2.0 PSI maximum glycol pressure drop. 5 HP, 460V, 3 PH motor.

PART 3 - EXECUTION

3.1 FACTORY TESTS

- A. Prior to shipment, the cooler manufacturer shall perform factory tests on each unit at the shop where the cooler is assembled. Tests shall include but not be limited to:
 - 1. Bolt torque confirmation.
 - 2. Hydrostatic or air pressure tests.
 - 3. All other manufacturer quality control tests.
- B. Submit test reports prior to shipping. All test reports shall be signed and dated.

3.2 PREPARATION AND SHIPPING

- A. After testing, each radiator shall be packaged in wooden crates of sufficient strength to protect them from damage during shipment, handling, and storage. The crates shall include a pallet base to allow lifting with a forklift.
- B. The exterior of each crate shall be clearly labeled with the community name “TULUKSAK”.
- C. Radiators shall remain in crates until arrival at the project site.
- D. Prior to installation, radiators shall be uncrated and thoroughly inspected for damage or defects.

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.
 - 5. Filters.

1.2 RELATED REQUIREMENTS

- A. Section 23 05 00 - Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Division 26 - Electrical.

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 under this Section in accordance with 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, actuators, filters, and all other items specified herein.
- C. Shop Drawings: Submit shop drawings for fabrication of ductwork. Note that if ductwork will be fabricated exactly as indicated on the 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 as required.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

- A. Galvanized Steel: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having zinc coating in conformance with ASTM A90.
- B. Aluminum: Type 5052 alloy, minimum 0.090” thick.
- C. Fasteners: Rivets, bolts, or sheet metal screws except where indicated as welded.
- D. Sealants, Mastics and Tapes: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.

2.2 FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated on the Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Fabricate assemblies from galvanized steel or aluminum as indicated on the Drawings. Galvanized sheet metal assemblies shall have standard mechanical joints sealed airtight. Aluminum assemblies shall have continuous welded joints. Grind weld joints smooth after fabrication.
- C. Exterior Hood Fabrications: Fabricate all exterior hoods from minimum 0.090" thick Type 5052 aluminum using welded joints.
- D. Provide stainless steel mesh and frames where indicated on the Drawings.

2.3 FANS

- A. Provide all fans as indicated in the Ventilation Equipment Schedule on Sheet M1.1.

2.4 CONTROL DAMPER

- A. Opposed blade low-leakage control damper, airfoil blades, galvanized steel construction, acetal bearings, stainless steel jamb seals, TPE blade seals. Greenheck VCD-33 or approved equal. See fabrication details on Drawings for sizes.

2.5 ACTUATORS

- A. On duct dampers install multi-voltage spring return actuator, Belimo AFBUP or approved equal.

2.6 FILTERS

- A. High capacity pleated panel filter, MERV 8 rating. Camfill 30/30 or approved equal. See fabrication details on Drawings for sizes.

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 rotation and operation of fans.
- C. Adjust actuators to achieve damper full open to full close operation.
- D. Provide two complete sets of filters for all intake ducts new in boxes as indicated on the Drawings.

END OF SECTION

SECTION 23 35 17
ENGINE EXHAUST AND CRANK VENT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Engine Exhaust Piping and Accessories.
 - 2. Crank Vent Piping and Accessories.

1.2 RELATED REQUIREMENTS

- 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 –
 - 2. Power Piping.
 - 3. ASME B31.9 - Building Services Piping.
 - 4. 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.

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.
- 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: Install at exhaust piping connections to engine as indicated in Drawings.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 23 05 00 - Common Work Results for Mechanical and Division 1.

- B. Product Data. Submit manufacturer's catalog information for pipe, fittings, equipment, appurtenances, hoses, hose clamps, and all other items specified herein.

1.6 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 pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Fabricator or Installer: Company specializing in performing Work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and leave in place until installation.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 EXHAUST PIPING

- A. Exhaust Pipe: ASTM A53 welded black steel pipe, Schedule 40, with ASTM A234 seamless carbon steel butt weld fittings and ASTM A105 weld flanges.

2.2 CRANK VENT PIPING

- A. Crank Vent Pipe: ASTM A106B black steel pipe, Schedule 40, with ASTM A105 socket weld and ASTM A234 seamless carbon steel butt weld fittings.

2.3 FLANGED JOINTS

- A. Exhaust Flanges: ANSI 150#, flat faced, slip-on weld flanges.
- B. Exhaust Flange Bolts: Plain carbon plain carbon steel (black) or stainless steel bolts, nuts, and washers. Install flat washers on both sides. Do not use lock washers. Coat with high temperature anti-seize prior to assembly.
- C. Flange Gaskets: Full face, rated for minimum 1000F continuous. Garlock 4122-FC, Metal Tech HT-195, or approved equal.

2.4 MUFFLERS

- A. Mufflers to be disc style, bottom center in and side out, ANSI 125# flanges, 2" internal acoustical/thermal wrap, high temperature satin black finish, with four

mounting tabs at bottom. Mufflers shall be critical grade with minimum 28db reduction at 125Hz. G.T. Exhaust Systems H1-5, Harco CFH, Miratech DCK, or approved equal. See Drawings for size.

2.5 RAIN CAPS

- A. Exhaust rain caps, hinged type, all stainless steel construction, G.T. Exhaust Systems or approved equal. See Drawings for size.

2.6 FLEXIBLE CONNECTORS

- A. Exhaust Pipe Flexible Connectors: Furnished with Engine Generator, see Section 26 32 13 – Engine Generators.

2.7 CRANK VENT HOSE

- A. Crank Vent Hose: Heavy duty oil resistant NBR hose, Eaton Winner WH004, or heavy duty oil resistant PVC suction hose, Tigerflex ORV. See Drawings for size.
- B. Install on barbed hose (king) nipples. Fasten with lined stainless steel constant torque clamps, Ideal-Tridon 47 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.
- B. Support muffler from structure as indicated on the Drawings.

3.4 INSTALLATION - PIPING

- A. Route piping in orderly manner and maintain gradient. Provide weep holes and open ends for condensate drainage as indicated.
- 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. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- E. Coat flange bolts with high temperature anti-seize prior to assembly. Torque flange bolts and mark with paint pen.
- F. Terminate crank vent hose on barbed (king) nipples and fasten with lined stainless steel constant torque clamps.

- G. Insulate interior exhaust piping and flex connector as indicated on the Drawings in accordance with Section 23 07 19.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. The work to be included in these and all other electrical 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. 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.
- C. 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.

1.2 RELATED REQUIREMENTS

- A. Division 1.
- B. All other Division 26 Specifications.
- C. See Divisions 21, 23, and 33 which contain information and requirements that apply to work specified herein.

1.3 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. NFPA 37, National Fire Protection Association - NFPA.
 - 3. ANSI-C2, National Electrical Safety Code NESC.
 - 4. International Building Code - IBC.
 - 5. 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, and
9. Underwriters Laboratory - UL

1.4 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform all work in accordance with above referenced codes and standards which are referenced to establish minimum requirements.
 1. If the Contractor observes that the Drawings 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.
- C. In addition, perform all work in accordance with the specific requirements of all Division 26 sections which follow. Wherever the specifications require higher grades of material or workmanship than required by the codes the specifications shall prevail.
- D. In accordance with Alaska statues and regulations, all Electrical work falling under the scope of 12 AAC 32.165 shall be performed under the supervision of an Electrical Administrator with a current license in the State of Alaska in the Unlimited Commercial Wiring Category.
- E. All electrical work shall be performed by Alaska licensed Journeyman Electricians or by licensed Apprentice Electricians under the direct supervision of a licensed Journeyman Electrician. Journeyman and Apprentice Electricians' current cards shall be available on the job site for review upon request.
- F. Perform all work in a neat and workmanlike manner using skilled craftsmen who are qualified and experienced in the specific type of work.
- G. Test all work as required by the specifications. Document all testing and submit results in accordance with specifications.

1.5 SPECIAL CONDITIONS AND REQUIREMENTS

- A. Ensure that appropriate safety measures are implemented and that all workers are aware of the potential hazards from electrical shock, burn, noise, rotating fans, pulleys, belts, hot piping, etc. associated with working near power generation and related equipment.
- B. 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 clearspace violation, notify the Authority in writing before proceeding with the installation.
- C. If hazardous location boundaries exist, they will be shown on the drawings. Locations for seal-off fittings shall be field determined by the Contractor.
- D. 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.

1.6 DRAWINGS, SPECIFICATIONS & SYMBOLS

- A. The Drawings and Specifications are complementary; what is shown on one is binding as if called for in both. Do not scale the Drawings. Locations of devices, fixtures, and equipment are approximate unless dimensioned.
- B. 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 Drawings or in the specifications.

1.7 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. "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.
- C. "Install" means to set in place and connect, ready for use and in complete and properly operating finished condition, material that has been furnished.
- D. "Provide" means furnish all products, labor, sub-contracts, and appurtenances required and install to a complete and properly operating, finished condition.
- E. "Product" is a generic term which includes materials, equipment, fixtures, and any physical item used on the project.
- F. "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.

- G. "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.
- H. "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.

1.8 SUBMITTALS – GENERAL REQUIREMENTS

- A. Provide submittals for all products and systems described in Division 26 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 with an index following specification format and with item by item identification.
- B. 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.
- C. Submittals shall demonstrate compliance with the requirements of the project. Furnish all relevant data as appropriate including but not limited to:
 - 1. Manufacturer's name and address, and supplier's name, address, and phone number.
 - 2. Catalog designation or model number with rough-in data and dimensions.
 - 3. Operation characteristics.
 - 4. 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.
 - 5. Wiring diagrams for the specific system.
 - 6. Coordination data to check protective devices.
 - 7. Shop Drawings.
- D. Provide submittals for all materials and equipment in the Division 26 specification sections which follow and submit under that specification section.

1.9 SUBMITTALS UNDER THIS SECTION

- A. All materials in the Electrical Equipment Schedule on the Drawings.

- B. All materials in the Electrical Conductor Schedule on the Drawings.

1.10 DEVICES AND EQUIPMENT

- A. Devices and equipment shall be listed for the intended service. Manufacturers or model numbers shown on the drawings or in the specifications is provided to indicate the required features. Substitutions of equivalent items will be accepted unless items specifically indicate no substitutes.
- B. Install all equipment such that the minimum required operating clearances are maintained.
- C. Protect all materials and equipment during the entire duration of construction work against contamination or damage. Replace or repair to original manufactured condition any items damaged during construction. Immediately report to the Authority any items found damaged prior to commencing construction.

1.11 RECEIVING AND HANDLING MATERIAL

- A. See General Conditions and 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.

1.12 TIMELY EXECUTION 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.

1.13 LAYOUT AND COORDINATION OF WORK

- A. Drawings are partly diagrammatic and it is not the intent to show in detail all features of work or exact physical arrangement of equipment. The locations 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 portions of work by other trades is 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.

1.14 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 compromised, 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.

1.15 PROJECT RECORD DRAWINGS

- A. In accordance with the requirements of Division 1 maintain record documents at the project site and make available for review by the Authority upon request.
- B. 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 below grade or in blind spaces within the building.
- C. At completion of project, deliver record documents in accordance with Division 1.

1.16 ELECTRICAL SYSTEMS TESTING AND REPORTING REQUIREMENTS

- A. Division 1 - Closeout Requirements.
- B. In addition to field testing, the Contractor shall perform all shop tests for fabricated items such as switchgear and engine-generators as required by the Division 26 specification sections which follow.
- C. Field testing shall include but not be limited to:
 - 1. Continuity of all circuits.
 - 2. Correct phase rotation.
 - 3. Megger test of all conductors size #2AWG and larger.
 - 4. Proper function of all switches and devices.
 - 5. Proper function of all control systems.
- D. Note that final field testing and commissioning of the switchgear and engine-generators will be performed by the Authority after substantial completion.

- E. Notify the Authority in writing seven (7) days in advance of tests. The Authority shall have the option to be present at all testing.
- F. Provide written documentation of all tests. The Contractor may use their own test forms or upon request the Authority can provide forms for common tests. Test reports shall include at a minimum the following information: item or system identification, air temperature, time, date, signature of person performing test, and photographs of testing in progress.
- G. Where tests disclose problem areas, retest after the defect has been corrected. Retesting after the repair of defects shall be performed at no cost to the Authority.
- H. Submit completed results of final successful tests along with photographs to the Authority for approval prior to Substantial Completion.

1.17 ELECTRICAL DEVICE CALIBRATION REQUIREMENTS

- A. Division 1 – Quality Control.
- B. Division 23.
- C. Calibrate all electrical and electronic measuring devices as indicated on the Drawings and in the Division 26 sections that follow.
- D. Support other trades as required with calibration of electronic devices furnished under Division 23.

1.18 SUBSTANTIAL COMPLETION

- A. In accordance with Section 01 77 00 - Contract Closeout Procedures, provide advance written notice to the Authority to schedule substantial completion inspection. Submit all required documents and ensure all conditions have been met.
- B. Provide Authority access to the site. Provide on-site transportation, ladders, lifts, etc. for inspection and testing of the work.
- C. 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.
- D. Conduct operating tests and demonstrate that all systems 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.
- E. Have instruments available for measuring voltage and current values and for demonstration of continuity, ground, or open circuit conditions. Provide services of qualified technicians familiar with equipment and systems to assist in taking measurements and making tests.
- F. Assist the Authority in instruction of operators on the proper operation and maintenance of all systems and equipment under this contract. Provide services of qualified technicians familiar with each item or system.

1.19 FINAL COMPLETION

- A. In accordance with Section 01 77 00 - Contract Closeout Procedures, provide notification of completion. Submit all required documents and ensure all conditions have been met.

1.20 WARRANTY

- A. In accordance with Section 01 73 00 – Execution Requirements, provide warranties for all systems and equipment.
- B. See Division 26 sections that follow for specific equipment warranty requirements. Wherever the Division 26 specifications have more stringent warranty requirements than Division 1, the Division 26 requirements shall prevail.

PART 2 – PRODUCTS

2.1 ELECTRICAL EQUIPMENT

- A. Provide all materials in the Electrical Equipment Schedule on the Drawings.

2.2 ELECTRICAL CONDUCTORS

- A. Provide all materials in the Electrical Conductor Schedule on the Drawings.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 26 05 02
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 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.

1.2 RELATED REQUIREMENTS

- A. This section applies to all Division 26 work.
- B. See Divisions 21, 23, and 33 which contain information and requirements that apply to work specified herein.

1.3 COORDINATION

- A. Layout all the work in advance and avoid conflict with other Work in progress. Physical dimensions shall be determined from Drawings and field measurements. Verify locations for junction boxes, disconnect switches, stub-ups, etc., for connection to equipment furnished by others, or in other Divisions of this Work.

1.4 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.

1.5 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

2.1 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 equivalent independent testing laboratory.
- C. 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 shall be subject to review for adequacy and compliance with Contract Documents.

2.2 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 equivalent independent testing laboratory.
- C. 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 devices shall be provided.

2.3 IDENTIFICATION

- A. Equipment Nameplates:
 - 1. Provide rigid engraved nameplates of laminated plastic 1/16-inch thick with white letters on a black or gray background. Nameplates for emergency equipment shall be red with white letters.
 - a. Securely attach nameplates with two screws, minimum.
 - 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. 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 Drawings, 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. Conduit Labeling: Unless a conduit is completely exposed and the purpose is clearly obvious, all conduits shall be permanently marked using a label maker.
1. Conduits Entering Panels: All conduits entering panels shall be labeled with the circuit numbers of the circuits contained inside.
 2. Concealed Conduits: Conduits that are concealed inside building structure or below grade shall be marked at each with the designation of the opposite end.
 3. For interior conduits the label shall be applied directly to the conduit. For exterior conduits the label shall be applied inside the junction box or conduit body where the conduit terminates.
- D. Junction Boxes: All junction boxes with steel covers shall be permanently marked using a label maker with the circuit numbers of wiring inside. For interior locations the label shall be applied on the outside and for exterior locations the label shall be applied inside the junction box.
- E. Conductors:
1. Conductors shall be color coded as indicated on the Electrical Conductor Schedule on the Drawings.
 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 or panel Fabricator. 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

3.1 STORAGE AND HANDLING

- A. Division 1 – Material and Equipment.
- 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.

3.2 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.

3.3 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. Installation of all equipment shall be in accordance with manufacturer's instructions.

3.4 SUPPORT SYSTEMS

- A. All interior materials used shall be galvanized or zinc plated.
- B. All exterior materials used shall be hot dip galvanized. Where support elements are field cut, exposed metal shall be coated with spray-on cold galvanizing.
- C. Support from structure or as specifically detailed on the Drawings.
- D. Conduits shown to be run at grade shall be supported by 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.

3.5 ANTI SEIZE

- A. Coat threads with anti-seize on all exterior bolts, stainless bolts, and where indicated under other sections or noted on the drawings.

3.6 MOUNTING HEIGHTS

- B. 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.
- C. Other mounting heights are indicated on the Drawings by detail.

3.7 CUTTING AND PATCHING

- 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

in a neat and workmanlike manner 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

3.8 FLASHING AND SEALING

- A. Seal all interior and exterior wall penetrations with polyurethane caulking. Seal both sides of walls where accessible.

3.9 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 installed in exterior locations.

3.10 CLEAN-UP AND COMMISSIONING

- A. Throughout the Work, the Contractor shall keep the work area neat and orderly by periodic clean-ups.
- B. As independent parts of the installation are completed, they may be placed in service and utilized during construction.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. This section describes general requirements, products, and methods of execution relating to the furnishing and installation of a complete grounding system as required for this project.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 00 - Common Work Results for Electrical.
- B. Section 26 05 02 - Basic Materials and Methods.
- C. Division 33.

1.3 MINIMUM REQUIREMENTS

- A. The minimum requirement for the system shall conform to Article 250 of the NEC.

1.4 SUBMITTALS

- A. Product Data: Provide in accordance with Section 26 05 00 Common Work Results for Electrical and Division 1.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Install types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications shall govern.
- B. Material: Copper only. Aluminum is not acceptable for use in any location.

2.2 WIRE AND CABLE CONDUCTORS

- A. Ground Grid or Grounding Electrode Conductors shall be bare copper conductors conforming to the following:
 - 1. Solid Conductors: ASTM B-3.
 - 2. Stranded Conductors: ASTM B-8.
 - 3. Tinned Conductors: ASTM B-33.
- B. Station Service Circuit Grounding Conductor: General use conductors in accordance with the conductor schedule, green insulated. Minimum No. 12 AWG.
- C. Generator and Feeder Circuit Grounding Conductor: Equivalent to the phase conductors in accordance with the conductor schedule, size as indicated.

2.3 GROUND CONNECTIONS

- A. Grounding conductor connections to building structure and to equipment skids

shall be made with mechanical lugs or compression lugs as indicated. Drill and tap steel structure and equipment and fasten with stainless steel bolts for positive bond to clean bare steel threads.

- B. Grounding conductor connections to pipes shall be made with pipe clamps specifically intended for the purpose. Remove paint to ensure connect to clean bare metal pipe.

PART 3 – EXECUTION

3.1 SERVICE AND STRUCTURE GROUND

- A. Create a Grounding Electrode System (GES) for this project by connecting the following:
 - 1. Generators, switchgear, and transformers grounded as shown on the Drawings.
 - 2. Equipment skids and building structure grounded as shown on the Drawings.
 - 3. Piping and other items grounded as indicated on the Drawings.
 - 4. The neutral conductors grounded only where specifically indicated on the Drawings.
- B. Current carrying capacity of the grounding and bonding conductors shall be in conformity with Tables 250.66 and 250.122 of the NEC.

3.2 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 Drawings, 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 minimum #6 AWG copper cable.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Support and align raceways, cabinets, boxes, fixtures, etc., in an approved manner and as specified.

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.
- D. Section 33 73 14 - Overhead Liquid-Filled Transformers.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems under this Section in accordance with Section 26 05 00 Common Work Results for Electrical and Division 1.

PART 2 – PRODUCTS

2.1 HANGERS AND SUPPORTS

- A. Support equipment and raceways on strut, brackets, trapeze hangers, or as detailed. Anvil, B-Line, Grinnell, Unistrut, or approved equal.

2.2 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. On all exterior installations provide hot dip galvanized strut and fittings.

2.3 FITTINGS AND ACCESSORIES

- A. Hanger Rods: Continuous threaded rod. Zinc plated 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. Zinc plated carbon steel except for exterior installations provide hot dip galvanized

2.4 FASTENERS

- A. All bolts, nuts, and washers to be zinc plated carbon steel except as specifically noted otherwise.
- B. On exterior installations provide hot dip galvanized steel bolts, nuts, and washers.
- C. Hanger Rods: Continuous threaded rod. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- D. Provide stainless wood screws and sheet metal screws where specifically indicated on the Drawings.

2.5 ANTI SEIZE

- A. Provide marine grade anti-seize lubricant for all bolted connections and where indicated. Minimum -20F to 2400F service range, non-metallic formula, salt water resistant. Loctite LB8023 or approved equal.

2.6 EARTHQUAKE ANCHORAGE

- B. Anchor equipment weighing more than 100 pounds to the building structure to resist lateral earthquake forces.
- C. 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.
- D. 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.

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. Obtain permission from the Authority before drilling or cutting structural members.

3.2 ANTI SEIZE

- A. Coat threads with anti-seize on all exterior bolts, stainless bolts, and where indicated under other sections or noted on the drawings.

3.3 INSTALLATION

- A. Conduits and equipment shall be mounted using strut or similar supports unless otherwise noted.

- B. Support material shall be cut square and smooth using a floor mounted bandsaw or chop saw. Hacksaws shall not be used to cut support material.
- C. Do not strap conduits to piping except where specifically detailed on the Drawings. 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.
- D. Conduits shown to be run at grade shall be supported by 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.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 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 Drawings, required by Code and specified in these specifications.

1.2 RELATED REQUIREMENTS

- A. Section 21 13 30 Fire Suppression.
- B. Section 26 05 00 Common Work Results for Electrical.
- C. Section 26 05 02 Basic Materials and Methods.
- D. Section 26 05 26 Grounding and Bonding for Electrical Systems.
- E. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.3 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.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data: Provide in accordance with Section 26 05 00 Common Work Results for Electrical and Division 1.

PART 2 – PRODUCTS

2.1 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.

2.2 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.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Liquidtight flexible conduit shall be manufactured from galvanized steel strip sealed with a polyvinyl outer jacket. It shall be listed and shall be marked for direct burial in accordance with NEC Article 350.10(3).
- 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.

2.4 FITTINGS

- A. Conduit bodies shall be factory made with threaded hub connections and weather tight screw type covers. For all exterior locations provide malleable iron conduit bodies with hot dipped galvanized finish.
- 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.

2.5 JUNCTION BOXES AND ENCLOSURES

- A. Metallic device/junction boxes for interior use with Electrical Metallic Tubing (EMT) shall be minimum .0625" thick SAE 1008 pressed steel with galvanized finish, 2-1/8" deep welded or drawn construction with 1/2" and 3/4" knockouts. Provide with 1/2" raised face metal covers.
- B. For interior electrical junction boxes larger than 4" square provide NEMA 1 steel wall mount screw cover enclosures. Minimum 12-gauge steel with color ANSI 61 gray powder coated finish. Hoffman, B-Line, or approved equal. Provide with plated or stainless-steel cover screws.
- C. Weatherproof gang boxes for exterior use and where specifically indicated shall be die cast zinc metal with powder coated finish and threaded hubs. Provide with matching weatherproof gasketed covers and mounting hardware.

PART 3 – EXECUTION

3.1 CONDUIT USAGE

- A. INTERIOR - All interior locations shall be electrical metallic tubing (EMT) except where specifically indicated as wireway or GRC.
- B. FIRE SUPPRESSION - All raceways for fire suppression shall be equivalent to INTERIOR previously specified except that all raceways, junction boxes, pull boxes, and cover plates shall be painted red.
- C. EXTERIOR - All exterior above grade locations shall be galvanized rigid conduit (GRC).
- D. Liquidtight flexible metal conduit shall be used in lengths of 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.

3.2 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. Provide seal off fittings when crossing hazardous boundaries into non-hazardous locations and at enclosures where required by Code. Not all locations where these fittings are required are shown.
- G. 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.
- H. 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.
- I. 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 and junction boxes shall be permanently labeled in accordance with Section 26 05 02.
- L. All conduits not used by this Contract shall have a pull wire installed and securely tied off at each end for future conductor installation.

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ATTACHMENT A, GENSET CONTROLLER SETTINGS TABLE

LIST OF ABBREVIATIONS

- CAC: Charger Air Cooler
- CPU: Central Processor Unit
- CPT: Control Power Transformer
- CT: Current Transformer
- ECU: Engine Control Unit
- EULA: End User License Agreement
- FPR: Feeder Protection Relay
- GC: Genset Controller
- GPH: Gallons per Hour
- HMI: Human Machine Interface (referred to as OIU)
- I/O: Input/Output
- kWh: kilowatt hour
- LAN: Local Area Network
- O&M: Operations & Maintenance
- OIU: Operator Interface Unit
- PLC: Programmable Logic Controller
- PT: Potential Transformer
- PSI: Pounds per Square Inch
- RPM: Revolutions per Minute
- RTD: Resistance Temperature Detector
- SCADA: Supervisory Control and Data Acquisition
- SMS: System Mode Switch
- UPS: Uninterruptible Power Supply
- UL: Underwriters Laboratory
- VAC: Volts, AC
- VDC: Volts, DC
- VFD: Variable Frequency Drive

SECTION 26 23 00

PRIME POWER LOW-VOLTAGE SWITCHGEAR

PART 1- GENERAL

1.1 SCOPE

- A. The Work shall consist of, but not be limited to, designing, fabricating, testing and providing complete and fully functional switchgear to parallel diesel-generators for prime power generation as indicated on the project design drawings and as specified herein.
- B. The specifications and project design drawings are complementary. What is shown on one is binding whether or not it is shown or specified in the other.
- C. The project design drawings consist of outline level drawings that depict the overall arrangement of the existing and new switchgear. Also included are the manufacturer's original switchgear shop drawings. The switchgear has been modified numerous times by multiple parties so the shop drawings do not represent as built conditions but are representative of the general arrangement.
- D. Provide a complete and operational system as specified herein. The components identified shall not be construed to be the complete list of components required for the successful operation of the system as specified. Provide all components and design required for the complete and successful operation of the system, conforming to all the requirements specified herein, whether the components are identified or not. Ensure all devices are installed and operate within their intended purposes. Check all catalog numbers indicated and coordinate all devices installed.
- E. The word "Fabricator" as used in this section shall mean the company responsible for assembly, wiring, and programming of control equipment and systems.
- F. The word "Contractor" as used in this section shall mean the Electrical Contractor responsible for field installation, testing, and commissioning of the system.
- G. The paralleling switchgear shall be capable of unattended automatic and manual operation as described herein. The switchgear controls shall be a fully coordinated system that provides the functions and features as specified herein.
- H. The automatic control and overall sequencing, starting, and stopping of the generators (Demand Control) shall be performed by a Programmable Logic Controller (PLC). Failure of the PLC shall not inhibit manual operation, paralleling, and control of the individual engine generators.
- I. Automatic start/stop shall be accomplished through the Genset Controllers (GC). Each generator shall have an electrically operated contactor to perform the normal online/offline paralleling functions of the generator which will be controlled by the GC.
- J. The distribution feeder shall have an electrically operated contactor to perform the normal online/offline functions.

- K. Variable frequency drives shall be provided in separate control panels for radiator fan control as indicated.
- L. The upgraded switchgear shall be fully tested with the engine generators as specified herein.
- M. The Fabricator shall provide up to an additional eight (8) hours of programming assistance and technical support to modify the system programming as requested by the Authority or its Designee(s). These hours are in addition to any technical requirements specified for programming, start-up, and commissioning efforts, and shall be included in the Fabricator's bid price. The programming assistance and technical support may be required to be provided at a single event or may be spread out over the year as directed by the Authority or its Designee(s), and will be performed remotely from the Fabricator's office and not at the Utility location.

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 23 05 – SCADA System for Switchgear Upgrades
- D. Section 26 32 13.50 – Owner Furnished Engine Generators

1.3 SUBMITTALS

- A. Provide in accordance with Section 26 05 00 Common Work Results for Electrical and Division 1.
- B. Provide a bill of material for all equipment or material provided as part of the switchgear.
- C. Provide manufacturer's catalog literature for all accessories and equipment. Literature shall be limited to only the items furnished and shall not include entire sections of catalogs or data sheets for items not used. Items shall be marked electronically such that it is clear which item is for what purpose.
- D. Provide complete and accurate shop drawings of the equipment as specified herein. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data. Provide all drawing files in Adobe PDF format. Upon request, provide drawing files in AutoCAD format; include all title blocks, external references, special fonts, and plot configuration files such that when plotted the AutoCAD file appears like the PDF file.
 - 1. All drawings submitted shall be drawn to accurate scale on sheets not less than 11" x 17"; except for actual pattern or template type drawings, the maximum sheet size shall not exceed 24" x 36". The preferable sheet size is 22" x 34". Indicate the name of the firm that prepared each shop drawing and provide appropriate project identification in the title block. Do not reproduce contract documents or copy standard printed information as the basis of shop drawings.
 - 2. All drawings shall use standard ANSI symbols.

3. Provide dimensioned drawings showing enclosure construction and arrangement. In addition, show the locations of all major face mounted devices such as meters, GC, OIU, FPR, VFDs, Breakers, etc. and all major internal components such as barriers, bus bars, CT, PT, etc.
4. Provide a one-line diagram, and three-line diagrams for all AC power circuits. The one-line diagram shall show at a minimum: breakers including frame size and trip setting; CT's CPT's, and PT's; protective devices; meters; control devices; and the size and temperature rating of all power conductors. The three-line diagrams shall show additional detail including wire terminations, CT shorting terminals, etc.
5. Provide schematics of all controls. Provide AC three line and DC control schematic diagrams for each generator, feeder, VFD, and master controls. Provide feeder and generator contactor/breaker control schematic diagram. Provide 24VDC control power schematic diagrams. Provide 120VAC control power and fan control schematic diagram. Schematics shall be in ladder diagram format and shall show all control devices, and wire and external terminal block numbers.
6. Provide a Point I/O communication network schematic diagram showing Point I/O modules with Node Addresses. Identify device location in switchgear.
7. Provide a communication network (LAN) schematic diagram showing all switches, meters, GC's, OIU, FPR, VFDs, Data Storage Server, PLC, and external I/O devices. Identify device location in switchgear. Include IP Address for all devices.
8. Provide a communication network schematic diagram showing CANbus connection to GC's, and J1939 connection to IKD-1 digital I/O expansion modules and engine ECU's. Identify device location in switchgear.
9. Provide drawings showing terminal block layouts and interconnecting wiring. The drawings shall show the physical layout of the terminal blocks with their appropriate designations and all connections between terminal blocks, auxiliary switch contacts, control devices, instrumentation, protection devices, etc.
10. Provide drawings of control switches showing all terminals with numbers, including terminals not used. Identify the use of the terminals.
11. Provide drawings that show annunciator layouts and nameplate engraving.
12. Provide the following PLC information: a complete ladder diagram showing all address numbers, rung reference numbers, and all preset register values. Include detailed narrative describing the purpose of each rung. Provide complete tables or schedules listing all utilized I/O addresses, internal relay addresses, and timer, counter, and register addresses and values. Include the latest revision date.
13. Clearly identify all shipping splits. Provide wiring harnesses for any control wiring required to connect between shipping splits. Drawings

shall clearly indicate the wiring harness and connections. Provide terminal blocks between the shipping splits for ease of wiring in the field.

- E. Upon completion of shop testing and prior to shipping, provide test reports documenting compliance with the testing requirements under Part 3.

1.4 QUALITY ASSURANCE

- A. Equipment provided under this section shall not have been in service any time prior to delivery, except as required by testing.
- B. 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 or equivalent standards exist for components, devices, and/or assemblies, such standards shall apply.
- C. Perform all work with skilled craftsman specializing in said work. Install all materials in a neat, orderly, and secure fashion as required by the specifications and commonly recognized standards of good workmanship.
- D. The existing switchgear is listed and labeled as an assembly under UL 891 or equivalent independent testing laboratory standard recognized by the State of Alaska. All work shall comply with the requirements of the National Electrical Code for Essential Electrical Systems and shall also comply with applicable standards of NEC, ANSI, IEEE and NEMA.
- E. The switchgear upgrades shall also be designed, assembled and tested in strict accordance with UL 508A Standard For Industrial Control Panels or equivalent.

1.5 FABRICATOR QUALIFICATIONS

- A. The switchgear upgrades shall be designed, assembled, and tested by a qualified fabricator (Fabricator) who is regularly engaged in the business of providing generation switchgear. A list of five prior projects that key staff have worked on may be requested by the Authority after the bid opening and prior to award to verify Fabricator qualifications. The list shall include installation date, description of installation, and a reference contact for each installation.
- B. At the time of bid submittal, the Fabricator shall have current authorization from a third-party listing agency to provide listed control panels, AVEC Drawings or equivalent. Evidence of authorization may be requested by the Authority after the bid opening to verify Fabricator qualifications.

1.6 FABRICATOR WARRANTIES

- A. The Fabricator shall warrant the work for a period of not less than one-year. The warranty period shall commence upon acceptance by AEA of field testing with the engine generators and final commissioning of the equipment.
- B. In the event of a failure of equipment or components or a failure of the system to perform all specified functions during the warranty period, the Fabricator shall repair or replace such defective equipment or components and revise programming and settings as required to achieve full system function. The

Fabricator shall assist the Authority as directed to determine the cause of failure and pursue manufacturer's warranties to the extent necessary to obtain replacement equipment and provide proof of action taken upon request.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Provide operation and maintenance (O&M) manuals for all equipment provided under this contract.
- B. The O&M 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.
- C. The O&M manuals shall include at a minimum the following information:
 - 1. Sequence of operation of the switchgear system.
 - 2. Documentation and operating description of SCADA system.
 - 3. A complete tag list of all input/output devices including, but not limited to, the PLC, GC, and all monitored and controlled devices.
 - 4. Bill of material for all equipment or material provided as part of the switchgear as previously indicated under Submittals.
 - 5. Manufacturer's catalog literature for all accessories and equipment as previously indicated under Submittals.
 - 6. Complete shop drawings as previously indicated under Submittals, revised to reflect as-built conditions of final construction.
 - 7. Complete test reports documenting all shop tests performed in accordance with requirements of Part 3.
- D. The O&M manuals shall consist of a single Adobe Acrobat PDF file and shall be complete with all revisions and as-built data to reflect the actual equipment and material installed. The O&M manual shall be organized as follows:
 - 1. Provide chapters to separate the different components into logical groupings, i.e. sequence of operation, warranty, bill of material, breakers, enclosures, battery system, meters, etc. At the beginning of each chapter, provide a page with the chapter number.
 - 2. Provide subchapters for each individual switchgear item. Bookmark each chapter and subchapter such that each component can be navigated to directly from the bookmark.
 - 3. Near the front of the PDF file, provide the Bill of Material organized so that each item is identified with the chapter or subchapter where the documentation is located.
 - 4. At the end of the PDF file, provide all drawings, inserted horizontally. Provide a chapter for the drawings and individually bookmark each drawing.
- E. Email download link for the final O&M file to the Authority and provide a copy to the Authority on a USB thumb drive.

PART 2 - PRODUCTS AND ASSEMBLY

2.1 GENERAL

- A. All equipment and material furnished shall be new. Equipment furnished and installed under this section shall be fabricated and assembled in full conformity with the project design drawings, specifications, engineering data, manufacturer's instructions, and applicable standards.

2.2 ACCEPTABLE MANUFACTURERS OF SWITCHGEAR COMPONENTS

- A. Specific parts manufacturer and model have been specified in the following paragraphs not only to meet performance function but also to coordinate and interface with other devices and systems. Approved equal substitutions will be allowed only by Authority's approval. To obtain approval, submittals shall clearly demonstrate how substitute item meets or exceeds specified item quality and performance characteristics and also complies with electrical connections and physical layout requirements.
- B. The following products are specified by brand and part number to maintain commonality for programming and service with similar switchgear used in other rural Alaskan communities. Substitutes will not be allowed for the following components:
 - 1. Programmable Logic Controller (PLC): Allen-Bradley.
 - 2. Genset Controller (GC): Woodward or ComAp.
 - 3. Metering Equipment: Shark 250.
- C. Acceptable manufacturers of all components not otherwise indicated shall be ABB, Allen-Bradley, Eaton, IDEC, or Square D.

2.3 SWITCHGEAR ENCLOSURE

The following paragraphs describe general fabrication requirements for the switchgear enclosure.

- A. Provide new panel faces as required for installation of new face mounted equipment. Panels shall be minimum 14 gauge steel, painted as indicated below.
- B. Provide new back and side pans as required for installation of new equipment and wiring. Panels shall be minimum 16 gauge steel, painted as indicated below.
- C. Panel faces and back/side pans shall be coordinated for proper fit and function within the existing switchgear cabinets.

2.4 PAINTING

- A. Steel and iron surfaces shall be protected by suitable paint or coatings. 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.

- B. The color of the exterior panel finish coats shall be ANSI 61 light gray. The color of the interior back and side pans shall be white.

2.5 CONTROL WIRING

- A. All control wiring for the switchgear shall be minimum 600-volt, copper 16-gauge, strand type SIS wire or equivalent. The Fabricator shall be responsible for sizing the appropriate wire for each component and circuit. Current transformer wiring shall be 12-gauge wire.
- B. Terminate all wiring 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. Provide all terminal blocks and exposed relays located in the controls compartment with a plastic safety cover. Terminal blocks for DC circuits shall be separated from terminal blocks for 120VAC.
- C. Wiring shall be installed in a neat and orderly manner in horizontal and vertical wiring troughs or channels with removable covers for easy accessibility. Wire bundles, when required shall not exceed one (1) inch in diameter. Adhesive backed Ty-Rap bases shall not be used to support bundles. All wiring bases shall be securely attached with metal screws.
- D. Extra flexible stranding wires shall be used in areas subject to flexing, such as areas where hinged brackets or swing racks/doors are used.
- E. Only one wire shall be inserted into a lug. Install lugs with a ratcheting type crimping tool. Tag all wires with wire markers at both ends.
- F. Splicing of control, CT, or PT wires is not allowed.
- G. All control wiring landing on screw terminals shall have solderless terminals, ABB Sta-Kon or approved equal. Solderless terminals for current transformer leads shall be insulated ring-tongue type, all others shall be insulated fork-tongue type. All lugs and solderless terminals shall be tin-plated copper.
- H. Wire current transformer leads to shorting type terminal blocks. Shorting pins shall be provided with storage locations for the shorting pins.
- I. Provide terminal blocks for control wires that run between the switchgear and external equipment and devices. Clearly label terminal blocks to match the designation shown on the Fabricator's drawings. Provide a separate terminal strip for interconnection with each generator. The generator terminal strip shall be arranged and numbered exactly as shown on the project design drawings.
- J. Both ends of each wire shall be identified per the marking and numbering shown on the wiring drawings with heat shrink or wrap-around adhesive labels.
- K. All ground wires shall have green insulation. Note that wires larger than #6 may be marked with green tape.

2.6 BUS BAR (NOT USED THIS SECTION)

2.7 GENERATOR AND FEEDER CIRCUIT BREAKERS AND CONTACTORS

- A. Each generator and the distribution feeder will be equipped with a manually operated solid-state molded case circuit breaker and an electrically operated contactor. Some existing breakers and contactors will remain in service and some will be replaced as indicated on the project design drawings.
- B. All new manually operated solid-state molded case circuit breakers shall have the following features:
 - 1. Frame rating as indicated on the project design drawings.
 - 2. Replaceable trip elements with a trip rating as indicated on the project design drawings.
 - 3. A shunt trip coil
 - 4. Auxiliary contacts to indicate position. The closed position contact shall be wired to the PLC to provide alarm indication any time the breaker is not closed (either tripped or manually opened).
- C. All new electrically operated contactors shall be Allen-Bradley Style 100B or approved equal. The contactor shall perform the normal on line/off line functions of connecting the generator and feeder to the bus. The contactor shall have the following features:
 - 1. Rating as indicated on the project design drawings.
 - 2. Auxiliary contacts that shall be wired to the PLC to indicate status. Provide position indication LEDs: Contactor Closed (red) and Contactor Open (green).

2.8 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. Provide nameplates 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 Authority. Nameplates inside the switchgear located on the front doors may be attached using adhesive epoxy.

Relays shall have the nameplates installed separate from the relay such that the relay can be removed without affecting the nameplate. Route all wiring such that it does not inhibit the visibility of the nameplate or interfere with the removal of the relay.

- B. Selector Switches. Selector switches shall be heavy-duty metal 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.

1. System Mode Switch. AUTO/MAN ISOCH, Two-position lever operated maintained contact. Electroswitch 24201C or approved equal.
 2. Feeder Control Switch. TRIP/ /CLOSE Three-position lever operated momentary contact spring return to center, Electroswitch 2438D or approved equal.
- C. Generator Lockout Switch (GLS). Key operated maintained contact OFF/RUN switch with normally closed contact. Allen Bradley 800FM-KM21 with metal latch 800F-ALM, Eaton Series 10250T1511-2, or approved equal.
- D. Reset and Test Buttons. Push type momentary contact, normally open, 22 mm, non-illuminated, flush mount with heavy duty metal latch. Allen Bradley 800FM-F2, or approved equal. Color as indicated. Provide contact blocks as required.
- E. Emergency Stop Button. Red push/pull maintained normally closed late-break contact with protective finger safe guard and yellow emergency-stop ring. Allen Bradley 800TC-FX6D4 operator, with 800T-NX1320 black guard, 800T-X646EM Yellow E-Stop ring and 800TC-XD1 normally open finger safe contact block, or approved equal.
- F. Annunciator Lights. LED cluster type panel mount lamps, 24 VDC. IDEC Corp. Series SLC40N, APEX Automation Solutions L7525 series, or approved equal.
- G. Enclosure Light. LED illumination kit with motion sensor, 24VDC. Rittal 2500320, STEGO 025411-10, or approved equal.
- H. 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-nickel contacts rated for 10 amperes at 120 volts AC. Relays utilized for PLC input, alarm input or indicating light service shall have contacts rated not less than 3 amperes. Provide all relays and timers with indicating lights. IDEC Corp., Phoenix Contact, or approved equal.
1. 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.
 2. Dead bus relay shall be IDEC RR3B-ULC, AC120V, with SR3B-05 base, or approved equal.
 3. Time delay relay shall be Crouzet OU1R10MV1, or approved equal
- I. Circuit Breakers.
1. Protective devices shall be resettable circuit breakers for all AC and DC circuits in the switchgear. Replaceable fuse type devices are not acceptable.
 2. Circuit breakers shall be molded case type of the amperage, voltage, short circuit capacity, and number of poles required for the application or as indicated on the one-line diagram.

3. Provide manually operated molded case circuit breakers to protect the branch power circuits of the variable frequency drives (VFDs). The breakers shall be sized and connected as indicated on the one-line diagram on the project design drawings, and as specified herein. Provide each breaker with a shunt trip.
 4. Provide manually operated molded case circuit breakers to protect the station service transformer and other branch circuits as indicated on the one-line diagram on the project design drawings. Provide auxiliary contacts to indicate position. The breakers shall be sized and connected as indicated, and as specified herein. Mount the breakers in the face of the switchgear with a protective guard.
- J. Current Transformers. Existing current transformers to remain in service are indicated on the project design drawings. Where indicated or required provide new current transformers 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. Provide current transformers of the window type with brass stud terminals. Insulation shall be suitable for 600 volt service at 60Hz.
1. Current transformers for relay service - minimum C20 accuracy class with a continuous thermal rating factor of 2.0 @ 30°C.
 2. Current transformers for meters shall be metering class with a continuous thermal rating factor of 1.5 @ 30°C. For CT ratios 200:5 and greater, provide 0.3% accuracy or greater with a burden rating of B0.1. For CT ratios less than 200:5, provide 1.2% accuracy or greater with a burden rating of B0.1.
 3. Multi-Ratio Current Transformers - Provide ratio as indicated with the accuracy specified at full distributed windings.
 4. The CT burden shall be suitable for the devices attached without saturating.
 5. All existing and new CT's shall be provided with shorting type terminal blocks complete with shorting pins.
- K. Potential Transformers. Existing potential transformers to remain in service are indicated on the project design drawings. Where indicated or required provide new potential transformers, minimum 150VA instrument rated, quantity and ratio as indicated or required. Hammond, Flex-Core, or approved equal. Provide primary and secondary protection using circuit breakers.
- L. Ambient Air Temperature Sensors. Provide moderate temperature range, 3-wire, platinum RTD, 100 ohms +/- 0.15%, @ 0°C tolerance. For indoor use provide Prosense RTD1-R01-01 with plastic vented housing, or approved equal. For outdoor use, provide Prosense RTD1-C06-01, NEMA 4X, or approved equal.

2.9 GENSET CONTROL PACKAGE

The basis of design is the Easygen as specified below. The only acceptable substitute is a ComAp IntelliGen 500. If using the ComAp, furnish equivalent modules and accessories as required to provide all features and perform all functions as specified for the Easygen.

- A. Genset Controller (GC). Door mounted style with display face, Woodward Easygen Model 3200XT-P1, Part Number 8440-2082, or ComAp IntelliGen 500.
- B. Easygen IKD-1 digital I/O expansion module, 8 inputs, 8 outputs. DIN rail mounting, 24V DC. Woodward 8440-2028, or ComAp equal.
- C. Signal Converter. Multi-input, 4-20mA / 0-10VDC Output. Provide for isolation protection of Easygen analog inputs. Omega DR-I3P, Prosense SCU-1600 or approved equal. In addition, provide minimum one (1) Signal Converter Programming/Display Module SCU-PDM1 with SCU-1600.
- D. Additional items, components, or wiring that may be required for a complete and operational system as specified herein.

2.10 PROGRAMMABLE LOGIC CONTROLLER

- A. Programmable Logic Controller. Allen-Bradley, CompactLogix 1769, no substitutes. Provide the following:
 - 1. 24VDC power supply. Allen-Bradley 1769-PB4.
 - 2. CPU (2 Mb Memory, Ethernet). Allen-Bradley 1769-L33ER.
 - 3. ModBus TCP/IP Communications Module. Pro-Soft MVI69E-MBTCP or Allen Bradley Add On Instructions.
 - 4. Right End Cap/Terminator. 1769-ECR.
 - 5. Point I/O Modules, 24VDC, as required which may include the following:
 - a. 8 point digital input module, sinking. Allen-Bradley 1734-IB8.
 - b. 8 point digital output module, sourcing. Allen-Bradley 1734-OB8.
 - c. 2 point analog input module, 4-20mA. Allen-Bradley 1734-IE2C.
 - d. 2 point analog output module, 4-20mA. Allen-Bradley 1734-OE2C.
 - e. 2 point RTD input module. Allen-Bradley 1734-IR2.
 - f. EtherNet/IP adapter. 24VDC power. Allen-Bradley 1734-AENT.
 - g. 24VDC power extension module. Allen Bradley 1734-EP24DC.
 - 6. Provide additional items as may be indicated on the project design drawings or required for the proper and complete operation of the system as specified.
- B. Provide cables, connectors, and interface devices as required for a complete and operational system.
- C. All I/O devices shall be connected in an EtherNet/IP network star topology configuration.

2.11 OPERATOR INTERFACE UNIT

- A. Operator Interface Unit (OIU). A human machine interface (HMI) referred to herein as OIU shall be installed on the front of the switchgear master section door. The OIU shall be an integrated touch screen display computer with solid state drives, Cincoze CV-115C / P1101, or approved equal. The OIU shall meet the following minimum requirements:
1. 15” display with minimum of 1024 x 768 pixel resolution.
 2. LCD Color: 16.2M, Pixel Pitch (mm): 0.297 (H) x 0.297 (V).
 3. Projected Capacitive Touch.
 4. Intel Quad Core Processor, minimum 2.0 GHz. 4 GB SO-DIMM DDR3L 1333 MHz memory, 128 GB SSD Drive.
 5. 3 USB 2.0 Ports, 1 USB 3.0 port, 10/100M Ethernet Port, serial port.
 6. 24VDC power supply.
 7. Minimum Windows 10 IoT Enterprise 2019, 64 bit.
 8. Passive cooling without fan.

2.12 FEEDER PROTECTION RELAY (NOT USED THIS SECTION)

2.13 METERING EQUIPMENT

- A. Bus Meter. Class 10 current inputs, 2 MB Memory, 120VAC input, 18-60VDC power supply. Provide with Ethernet communications port, panel mount remote display module, cable, and optional 4-20mA I/O card. SHARK 250-60-10-V2-D-INP100S-20mAOS, no substitutes.
- B. Station Service Meter. The station service meter shall be identical to the bus meter except without the optional 4-20mA I/O card. SHARK 250-60-10-V2-D-INP100S-X, no substitutes.
- C. Provide all cables, connectors, and other devices including CT shorting terminal blocks as required for a complete and operational metering system.

2.14 DATA STORAGE SERVER

- A. An industrial fanless mini PC shall be installed in the switchgear master section. The mini PC shall be as follows:
1. Processor: Intel Core i7.
 2. Ram: 16 GB, SO-DIMM DDR4 3200MHz (non-ECC).
 3. Hard drive: minimum 1 TB M.2 NVMe SSD.
 4. Auto Power On.
 5. Dust Filter for Small Form Factor.
 6. Minimum Windows 10 IoT Enterprise 2021, 64 bit.
 7. DIN Rail Mounting Kit or Mounting as required.

8. 60W 12VDC Power Supply.
 9. OnLogic ML100G-56 or approved equal.
- B. Furnish and install all cables and interface devices required for a complete and operational system plus any additional devices that may be required to be fully functional and meet the requirements of these specifications.

2.15 LOCAL AND REMOTE ACCESS

- A. Provide the switchgear with an Ethernet connection for access to the switchgear LAN via high speed internet. See Summary of Work, Section 01 11 13, for internet service requirements.
- B. Industrial Ethernet Switch. 16 port, Unmanaged, 10/100/1000 MBPS, 24VDC Ethernet switch, Phoenix Contact FL SWITCH 1116N, 1085219 or approved equal. All equipment shall be connected to provide seamless communication between the PLC, LAN devices and the Ethernet connection to the Internet. Provide multiple switches for systems requiring more than 16 ports.
- C. The data storage server shall store historical and real time data from the PLC, Bus and Station Service Meters, Radiator and Charge Air Cooler VFD's, Genset Controllers, Feeder Protection Relay(s), and other LAN-connected devices, and shall provide the primary means for remote access via LogMeIn for data retrieval, remote monitoring, and device programming access.
- D. All devices on the switchgear LAN shall be remotely accessible via the internet for system monitoring, data acquisition, and troubleshooting. Remote access shall allow a technician in another location to modify and/or view all operational screens and all logic in the PLC, as well as the GCs, FPR, VFDs, Data Storage Server, metering equipment and LAN Router.
- E. Provide communications connections as required for the proper operation and control of the systems.
- F. The internet service will be Starlink Standard Gen3 with business local priority 50GB plan. It will have the following performance characteristics: 40 MBPS download, 10 MBPS upload, 50 GB priority monthly data limit. The Starlink account IP policy will be configured to "Public IP" and "Bypass Mode" will be enabled. The switchgear remote access and SCADA shall be configured to be fully compatible with the Starlink service.

2.16 CONTROL POWER

- A. Control power for the switchgear shall be 24VDC, except where specifically indicated otherwise. All meters and other components requiring auxiliary power to operate shall operate from the 24VDC control power source, unless otherwise specified. All control circuits shall be 24VDC.
- B. Provide a complete 24VDC power supply with redundant secondary backup. Include all items described below plus all other components required for a complete system. The primary source shall be a 120VAC to 24VDC power supply using 120VAC station service power. The secondary source shall be from a 24VDC-24VDC battery buffer module using power from 24VDC engine batteries

as indicated below. The 24VDC control power system shall include the following major equipment:

1. Primary Power Supply. 100-240VAC primary input, minimum 20 amp, 24VDC output at 45°C. PULS CP20.241-S1, Phoenix Contact 2904062, or approved equal. Install in the master section. Set output to 26 VDC to ensure it operates as the primary source when AC power is available.
 2. Battery Buffer Module. 22-29VDC input, minimum 15 amp, 24VDC output. The module shall include capacitors to buffer power during engine crank cycles with a minimum capacity of 15A for 9 seconds. Siemens 6EP1933-2EC51, or approved equal. Install module in the master section. Set dipswitch 3 to ON (22.5VDC cut-in) and dipswitch 12 to ON (Operating State).
 3. Power Bridge Rectifier. 35A minimum. Powersem PSB-35/08 or approved equal.
- C. The DC power from the engine batteries shall enter in the respective generator section. A 20A circuit breaker shall be installed on the battery power supply.
- D. The 24VDC outputs from each generator section shall be connected to the 24VDC input on the battery buffer module in the master section through power bridge rectifiers, quantity as required for the number of inputs.
- E. The 24VDC outputs from the Primary Power Supply, the Battery Buffer Module, and the engine batteries shall be connected together in the master section through power bridge rectifiers. The power sources 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 prioritized as follows:
1. Primary Power Supply (120V AC Source - Primary).
 2. Battery Buffer Module (24V DC Source - Secondary).
 3. Engine Batteries (in the event of a fault of the Battery Buffer Module).
- F. The 24VDC power supply to each switchgear section (master, generator, and feeder/VFD) shall be isolated through a 15A circuit breaker in each respective section.
- G. Each major device or meter shall be individually protected by circuit breakers. Clearly mark each circuit breaker for the intended service.
- H. 120VAC Control and Utility Power – Provide one set of terminals for connection of incoming 120VAC power, 20A, single phase. The 120VAC system shall include:
1. The control and utility power circuit shall provide power to the ventilation fans, UPS, and to the 120VAC to 24VDC Primary Power Supply. No other devices shall be connected to this circuit. Provide a 10A circuit breaker to serve the ventilation fan, a 10A circuit breaker to serve the UPS and a 10A circuit breaker to serve the Primary Power Supply.

2. UPS – Rack-mount UPS shall be complete with a sealed leak-proof maintenance free lead acid battery. It shall be 120V, 60Hz, 15A input and 120V, 60Hz, 1500VA output. Tripp-Lite SMART1500LCD, APC SMT 1500C or approved equal.
3. The UPS shall be installed in the master section and shall be connected to provide 120VAC power to the data storage server and internet router.

2.17 VARIABLE FREQUENCY DRIVES

- A. Provide separate VFD panels for control of the radiator fan motors. Install in wall mount NEMA 12 enclosures sized as indicated. Include at a minimum the components indicated on the project design drawings.

2.18 ENGINE/GENERATOR SECTION ASSEMBLY

- A. Provide the following components for each generator section as required to allow automatic or manual operation and control of each generator.
 1. Genset Controller (GC). The GC shall communicate with the PLC over the LAN via Modbus TCP and through Point I/O modules. The top of the GC screen shall not exceed 60” above the bottom of the switchgear.
 - a. Signal Converter. Provide a signal converter on Analog Input 1 to provide isolation and protection
 - b. EasYgen IKD-1 digital I/O expansion module. Provide as needed to meet the functional requirements of the system.
 2. Generator Lockout Switch. Provide a key operated OFF/RUN switch mounted in each generator control section door. All switches for the entire project shall utilize a common key. Provide two keys for each generator section.
 3. Alarm Reset. Provide an Alarm Reset push button that resets all GC alarms after the alarm condition has been corrected.
 4. Service Hours Reset. Provide a Service Hours Reset push button that resets the timer for engine service (oil change) intervals.
 5. Generator Contactor and Circuit Breaker.
 6. Current Transformers for relaying.
 7. Potential Transformers.
 8. Control power transformer for spring charging motor.
 9. 24VDC 15A circuit breaker for control power.
 10. Enclosure LED illumination kit, complete with motion sensor.
 11. Provide Terminal Blocks, Relays, Timers, Bases, as needed.

12. Generator breaker Status Annunciation LEDs (mount immediately below Generator Lockout Switch):

- a. Generator “#” Contactor Closed (red)
- b. Generator “#” Contactor Open (green).

13. Provide annunciation LED’s, mount near top of cabinet, left to right:

Top Row

- 1) Engine Running (green).
- 2) Alarm/Lockout (red).
- 3) Low Oil Pressure (red).
- 4) Oil Level (red).
- 5) High Coolant Temperature (red).
- 6) Over Speed (red).
- 7) Over Crank (red).
- 8) Running Timeout (red).
- 9) Battery Charger Failure (red).
- 10) Air Filter Plugged (red)
- 11) High Exhaust Temperature (red).
- 12) Spare.

Second Row

- 1) Lead Engine (green). Note that this is only for Gen#2 and Gen#3. For other sections provide spare.
- 2) Normal Stop (amber).
- 3) Not in Auto (red).
- 4) Service Engine (red).
- 5) Fail to Synchronize (red).
- 6) Over Current (red).
- 7) Under Voltage (red).
- 8) Over Voltage (red).
- 9) Under Frequency (red).
- 10) Over Frequency (red).
- 11) Reverse Power (red).
- 12) Spare.

2.19 MASTER SECTION ASSEMBLY

- A. Provide the following components in the master section:
1. PLC.
 2. OIU.
 3. Bus Meter.
 4. Station Service Meter.
 5. Data Storage Server.
 6. Control Power Supply, 120VAC / 24VDC.
 7. Battery Buffer Module.
 8. Uninterruptable Power System (UPS)
 9. Dead bus relay.
 10. Industrial Ethernet Switch, minimum quantity two.
 11. System Mode Switch, AUTO / MAN ISOCH.
 12. Emergency Stop Button.
 13. A single RESET push button that manually resets all master section alarms.
 14. A single LAMP TEST push button that tests all master section and engine generator section annunciation LEDs simultaneously. Note that this includes all master and generator section lamps but does not include VFD lamps.
 15. Feeder manual control switch, open/close spring return to center, with status LED indicating lights, Open (green), Closed (red).
 16. Terminals and circuit breakers for switchgear control and utility power.
 17. Enclosure LED illumination kit, complete with motion sensor.
 18. Terminal Blocks, Relays, Timers, Bases, as required.
 19. Spare Input: Provide a minimum of 2 spare PLC discreet input pairs wired to terminal blocks.
 20. Spare Output: Provide a minimum of 2 spare two-pole relays wired to terminal blocks and controlled by PLC.
 21. Master annunciation LED's, mount near top of cabinet, left to right:
Top Row
 - 1) Fire Alarm (red).
 - 2) Emergency Stop (red).
 - 3) Low Coolant Level (red).
 - 4) Fuel Level (red).

- 5) PLC/ Point I/O Failure (red).
- 6) System Not In Auto (amber).
- 7) Station Service Breaker Open (red).
- 8) VFD Main Breaker Open (red).
- 9) Feeder Breaker Trip (red).
- 10) Feeder Fail To Close (red).

Second Row

- 1) Spare (red).
- 2) Spare (red).
- 3) Spare (red).
- 4) No Load On Heat Recovery (amber).
- 5) Heat Recovery Loss Of Pressure (amber).
- 6) Heat Recovery Loss Of Flow (amber).
- 7) High Coolant Return Temp (red).
- 8) Spare (red).
- 9) Spare (red).
- 10) Spare (red).

- B. Provide two ambient air temperature sensors, one for outside air temperature and one for inside air temperature.

2.20 DISTRIBUTION FEEDER SECTION ASSEMBLY

- A. Provide the following feeder components:
1. Molded case feeder circuit breaker.
 2. Electrically operated feeder contactor.
 3. Molded case station service circuit breaker.

PART 3 - PROGRAMMING, TESTING AND PACKAGING

3.1 SYSTEM PROGRAMMING AND SOFTWARE INSTALLATION

- A. The Fabricator shall furnish and install the following software on the Data Storage Server. All licenses shall be in the name of the Alaska Energy Authority
1. AB Studio 5000 Mini Edition EN License (PLC programming software).
 2. Woodward Toolkit Easygen (GC configuration software) or ComAp equal.
 3. Square D SOMOVE (or software for VFD provided if different).
 4. SHARK metering software (latest version).

5. LogMeIn (AEA will provide installation credentials)
6. Any other devices installed in the switchgear that have custom software.
- B. The Fabricator shall provide all PLC and GC programming as required to meet the requirements and intent of this specification.
- C. The Fabricator shall prepare a complete tag list of all input/output devices including, but not limited to, the PLC, GC, and all monitored and controlled devices. The Tag List shall be in the form of a spreadsheet. If additional I/O or tags are requested by the Authority the Fabricator shall provide that information. The tag list shall be used in the development of the SCADA system. A copy of the final tag list shall be included in the O&M Manual.
- D. The Fabricator shall install the SCADA software as specified in 26 23 05.
- E. The Authority will provide a list of I.P. Addresses and Subnet Masks for the Fabricator to assign to all devices on the LAN.
- F. The Authority will provide a list of usernames and passwords for the Fabricator to install on the system.
- G. The Authority will provide a list of I.P. Addresses and Subnet Masks for the Fabricator to assign to all devices on the LAN.
- H. Upon completion of testing, archive at a minimum the following files on the server:
 1. The original licensed copy of each software package.
 2. The End User License Agreement (EULA).
 3. Final setup files for the CG (Woodward wset), VFD, and Meters.
 4. Final PLC programming.
 5. Final Tag list.
- I. Provide an identical copy of all archived files on a USB thumb drive and submit with the record drawings and other close out materials.

3.2 INSPECTION AND WITNESS TESTING

- A. The Authority shall have the right to inspect, at the shop, all equipment covered by these specifications any time during manufacture and assembly and to be present during any equipment tests.

3.3 SHOP TESTING

- A. The Fabricator shall shop test new door assemblies along with associated back and side pans to the maximum extent practicable to verify satisfactory operation of specified performance. If the Authority elects to witness the testing, the Fabricator shall provide sufficient notice.

3.4 FIELD TESTING

- A. Upon completion of field installation, the Contractor shall fully test the switchgear. See Section 01 11 13 - Summary of Work for additional testing requirements.
- B. Prior to field testing the SCADA system shall be fully functional as specified in Section 26 23 05. The switchgear control system shall be fully tested using the SCADA system as specified herein. The OIU shall be fully functional and the switchgear shall be fully tested using the OIU. All alarm and control functions specified shall be available and indicated on the OIU.
- C. Test procedures shall conform to ASME, IEEE, and ANSI standards, and NEMA standard practices section on testing, as appropriate and applicable. The Contractor 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.
- D. Field Testing and Commissioning shall coincide with Substantial Completion. Provide written notice to the Authority in accordance with 01 77 00 Contract Closeout. The Authority reserves the right to witness all tests.
- E. Prior to performing tests verify that all field assembly is complete, all bus connections have been torqued to manufacturer's recommendations, and all interconnecting wiring has been connected and secured.
- F. 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.
- G. Perform adequate tests prior to Substantial Completion to verify that the switchgear is fully functioning. At a minimum, provide the following setup and operational tests:
 - 1. Calibrate and set all protective devices.
 - 2. Verify that the system performs the sequence of operations as specified under Part 4.
 - 3. Verify all engine and generator monitoring and control functions for each GC.
 - 4. Verify all engine and generator protection functions for each GC.
 - 5. Verify that the PLC starts and stops each generator based on the control requirements specified under Part 4.
 - 6. Verify that each VFD operates properly.
 - 7. Verify that each annunciation point operates correctly. For external alarms, simulate the alarm.
 - 8. Verify that all screens on the SCADA display correct data. Use an external computer to verify remote access for SCADA.

9. Verify that all trending functions are operational and are being archived on the data storage server.
 10. Disconnect 120-volt AC control power in the master section to verify that the system continues to operate without interruption from the 24VDC source and that the server continues to operate from the UPS. Briefly turn off the 24VDC source and verify function of the battery buffer module.
- H. Repeat tests during Substantial Completion as required by the Authority to adequately demonstrate satisfactory operation of all functions.

3.5 PACKAGING

- A. Door assemblies, back pans, and side pans shall be individually shrink wrapped, packed, crated and rigidly braced to protect from damage during shipment, handling and storage. Each section shall be crated so that it can be shipped upright or placed flat on the backside of the crate. The packaging shall be waterproof. Moisture absorbent packages shall be placed in each compartment to ensure that moisture does not condense inside the switchgear.
- B. All other included components (spare parts, loose items, etc.) shall be packaged individually in waterproof wrapping. Each individual component package shall then be packed in a box or crate, and each box/crate wrapped in waterproof wrapping to prevent corrosion to the components during extended periods of outside storage. All boxes or crates shall be palletized onto the minimum number of pallets, as required for the quantity and size of the boxes/crates.
- C. Suitable attachments shall be provided on the bottom of the crates for lifting or moving the equipment to final location. Provisions shall not necessitate disassembly of the equipment. Instructions for lifting the crates shall be provided. Additionally, the weight and center of gravity shall be provided.
- D. Exterior of crating shall be clearly marked with the community name and the contents identification (e.g. Tuluksak Gen #2).
- E. Two copies of the packing slip identifying the quantity of pallets, the crates/boxes on each pallet, and the listing of component packages within each box/crate shall be provided to the Owner.

PART 4 - MONITORING, CONTROL, AND SEQUENCE OF OPERATION

4.1 ENGINE MONITORING

- A. The GC shall monitor temperatures, alarms and status of the following engine devices:
 1. Monitor engine speed, jacket water temperature, lubricating oil pressure, and fuel flow rate from the engine ECU via J1939.
 2. Engine Runtime. Log and maintain engine runtime. Time shall be expressed in hours. Note that when the engine ECU is off, the SCADA shall continue to display the Engine Hours at the time the engine stopped.

3. Hours until Engine Service. Using the engine runtime from the GC, the PLC will log and maintain hours until engine service required. Time shall be expressed in hours.
4. Generator Lockout Switch. Connect key switch to GC Discrete Input 5.
5. Oil Level Switch. Monitor status of engine-mounted oil level switch through GC Discrete Input 3 and 4. A normally open switch closes when the oil level drops below or rises above a pre-determined level.
6. Exhaust Gas Temperature. Monitor exhaust temperature through GC Analog Input 1 via a 4-20mA signal converter. The exhaust gas temperature sensor is a 2-wire 100 ohm RTD.
7. Air Filter Vacuum. A normally open switch will close indicating air filter restriction through Discreet Input 6.

4.2 AMBIENT AIR TEMPERATURE MONITORING

- A. The PLC shall monitor the following:
 1. Outside Air Temperature. Monitor ambient outside air temperature with a moderate temperature range, 100 ohm, 3-wire, platinum RTD, through a Point I/O analog RTD input module.
 2. Inside Air Temperature. Monitor ambient plant air temperature with a moderate temperature range, 100 ohm, 3-wire, platinum RTD, through a Point I/O analog RTD input module.

4.3 FUEL AND OIL SYSTEM MONITORING

- A. The PLC shall monitor the following:
 1. Intermediate Tank Fuel Use Quantity. The day tank can draw fuel from either the power plant intermediate tank and from the water plant intermediate tank. A change over switch in the day tank control panel shall provide two separate inputs to the PLC, one for each intermediate tank. The PLC shall monitor the daytank meter pulser through a Point I/O digital input module and shall calculate the fuel used from each tank and store in separate registers. Note that the day tank meter pulser provides one pulse per each gallon of fuel.
 2. Plant Total Fuel Consumption and Last Day Tank Fill Cycle Quantity. The PLC shall calculate the total plant fuel consumption and the last day tank fill cycle quantity from the day tank supply meter.
 3. Plant Fuel Efficiency. The PLC shall calculate the overall plant fuel efficiency (kWh/gallon). At the end of each day tank fill cycle, divide the total kWh generated since the end of the last fill cycle (from bus power meter) by the gallons of fuel pumped into the day tank during the latest fill cycle.
 4. Low Fuel Level Alarm. Monitor daytank low level switch status through Point I/O digital input module. A normally closed contact on the day tank

- control panel will open when the fuel level in the day tank drops below a preset level.
5. Generator Fuel Consumption. The PLC shall read the instantaneous fuel flow rate (gallons per hour) and the total fuel consumption (gallons) from the engine ECU via J1939.
 6. Fuel Return Temperature. Monitor diesel fuel return temperature through Point I/O analog input module via a 4-20 mA, -52°F to +302°F range temperature transmitter. Power supply for the transmitter shall be provided from the switchgear 24VDC power supply.
 7. Using remote I/O monitor status of the day tank including:
 - a. Day Tank Pump P-DF1 Run.
 - b. Day Tank Control Power.
 - c. Day Tank Low Level Alarm.
 - d. Day Tank Overfill Alarm.
 - e. Day Tank Pump P-DF1 Time Out Alarm.
 - f. Remote Actuator Valve Open.
 - g. Fuel Filter Water Indication.
 8. Using remote I/O monitor status of the used oil blender including:
 - a. Blender Pump P-DF2 Run.
 - b. Blender Pump P-UO2 Run.
 - c. Blender Control Power.
 - d. Blender Filter #1 Plugged.
 - e. Blender Filter #2 Plugged.
 - f. Blender Hopper Low Oil Level.

4.4 COOLING SYSTEM MONITORING

- A. The PLC shall monitor the following:
 1. Low Coolant Alarm. Monitor low coolant level switch status through Point I/O digital input module. A normally closed switch in the coolant piping will open when the coolant drops below a preset level.
 2. Coolant Level Sensor. Monitor coolant level through Point I/O analog input module via a 4-20 mA, 0% to 100% range signal conditioner. Power supply for the signal conditioner shall be provided from the switchgear 24VDC power supply.
 3. Coolant Return Temperature. Monitor engine coolant return temperature through Point I/O analog input module via a 4-20 mA, -52°F to +302°F range temperature transmitter. Power supply for the transmitter shall be provided from the switchgear 24VDC power supply.

4. Coolant Return Pressure. Monitor coolant fluid pressure through Point I/O analog input module via a 4-20 mA, 0 to 20 PSIG range pressure transmitter. Power supply for the transmitter shall be provided from the switchgear 24VDC power supply.

4.5 HEAT RECOVERY SYSTEM MONITORING

- A. The PLC shall monitor the following:
 1. Heat Recovery Pressure. Monitor heat recovery fluid pressure through Point I/O analog input module via a 4-20 mA, 0 to 60 PSIG range pressure transmitter. Power supply for the transmitter shall be provided from the switchgear 24VDC power supply.
 2. Heat Recovery Supply Temperature. Monitor heat recovery supply temperature through Point I/O analog input module via a 4-20 mA, -52°F to +302°F range temperature transmitter. Power supply for the transmitter shall be provided from the switchgear 24VDC power supply.
 3. Heat Recovery Return Temperature. Monitor heat recovery return temperature via Modbus TCP from the CIM card on the heat recovery pump.
 4. Heat Recovery Flow Rate. Monitor heat recovery fluid flow rate via Modbus TCP from the CIM card on the heat recovery pump.

4.6 OIU DISPLAY

The OIU shall provide the operator local access to the demand control system setup parameters and shall display all screens required for system monitoring. The OIU shall communicate with the data storage server via the LAN for SCADA information.. The OIU programming and development of all display screens shall be provided by the Fabricator, see SCADA specification 26 23 05. The Fabricator shall program the following functions and display the following data. All multiplication factors or other proportional scaling of the raw data shall be provided by the Fabricator so the data provided will not need to be modified.

- A. Demand Control – Generator kW rating (overload level), raise level set point, raise level time duration, lower level set point, lower level time duration.
- B. Generator Control – Amount of time each generator will run off-line before it is shut down (cooldown duration).
- C. Engine/Generator Data:
 1. Alarms – All engine/generator alarm conditions.
 2. Status of the engine (Off, Auto, Manual)
 3. Status of the contactor (open or closed).
 4. Phases A, B, and C voltage, current, and power factor.
 5. Generator Frequency (Hz).
 6. Engine Speed (RPM).

7. Engine Run Time (hours).
 8. Hours until Engine Service (hours).
 9. Engine Water Jacket Temperature (°F).
 10. Engine Exhaust Temperature (°F).
 11. Engine Oil Pressure (PSI).
 12. Engine Air Cleaner Vacuum (in-H₂O).
 13. Engine Fuel Flow Rate (GPH).
 14. Fuel Efficiency (kWh/Gal).
 15. Total kWh Generated.
 16. Lead Engine - where engines are the same capacity.
- D. Bus/Station Service Power Data:
1. Bus Phases A, B, and C voltage and current.
 2. Bus frequency, kVAR, kW and power factor, total kWh and peak demand.
 3. Station service Phases A, B, and C current.
 4. Station service kW and total kWh.
 5. Position indication for station service breaker.
- E. Feeder Data:
1. Position indication for feeder contactor.
 2. Trip indication for feeder breaker.
 3. Feeder Monitoring kW and total kWh. Calculate the feeder kW and kWh by subtracting the station service readings from the bus meter readings.
- F. EtherNet/IP Point I/O Status
- G. Fuel/Oil System Data
1. Fuel Return temperature.
 2. Power plant intermediate tank total fuel use.
 3. Water plant intermediate tank total fuel use.
 4. Plant total fuel use.
 5. Plant total fuel efficiency.
 6. Plant previous 30 minute fuel efficiency.
 7. Day tank last fill quantity.
 8. Fuel filter water indication.
 9. Day tank pump P-DF1 run.
 10. Day tank control power.

11. Day tank low level alarm.
 12. Day tank overflow alarm.
 13. Day tank pump P-DF1 time out alarm.
 14. Power plant actuator valve open.
 15. Water plant actuator valve open.
 16. Blender pump P-DF2 run.
 17. Blender pump P-UO2 run.
 18. Blender Control Power.
 19. Blender filter #1 plugged.
 20. Blender filter #2 plugged.
 21. Blender used oil hopper low alarm.
- H. Ambient Temperature Data:
1. Outside Air Temperature.
 2. Inside Air Temperature.
- I. Engine Coolant Data:
1. Low coolant level alarm.
 2. Coolant level.
 3. Coolant return temperature.
 4. Coolant return pressure.
- J. VFD Data – All data available from each variable frequency drive, quantity as indicated on the communication diagram of the project design drawings.
1. Radiator coolant temperature.
 2. VFD breaker open.
 3. VFD frequency.
 4. VFD status (VFD, Off, Bypass, Running, Fault).
- K. Heat Recovery System Data:
1. Supply Temperature.
 2. Supply Temperature Signal Lost.
 3. Return Temperature.
 4. Return Temperature Signal Lost.
 5. System Pressure.
 6. Flow Rate.
 7. No Load Warning.

8. Loss of Pressure.
9. Loss of Flow.
10. Recovered Heat Output.
11. Total Recovered Heat Delivered.

4.7 GENERAL CONTROL SPECIFICATIONS

- A. The switchgear shall automatically and manually connect and parallel all generators to the switchgear main bus.
- B. The PLC shall control the demand control system and overall sequencing, starting, and stopping of the engine generators. The SCADA on the OIU shall provide operator access to the demand control settings and shall display the current demand control settings and status.
- C. The GC shall control all functions and features of the generator under both automatic and manual control. The GC shall start, stop, synchronize, and provide load sharing of the generator. All GC's shall communicate via the CAN #1 bus for load sharing. If the communications bus is disabled, each GC shall be fully capable of operating the individual generator in manual mode.
- D. The Fabricator shall review all project design drawings and information provided and shall incorporate all required engine and generator safety functions into the GC.

4.8 GENERATION SEQUENCE OF OPERATION.

- A. A complete and successfully operating system shall be provided for starting, stopping, and paralleling, both automatically and manually, all engine generators. The following paragraphs describe the basic functional requirements of the system. The Fabricator shall be responsible for the detailed design to provide a safe and satisfactorily functioning system.
- B. The PLC shall monitor the system load and status and shall control automatic start and stop of each unit. Time delays shall be incorporated in the PLC that shall be adjustable through the OIU. Use relays in conjunction with PLC logic for automatic start/stop. Failure of the automatic control system shall not prevent the manual operation of the system to start, stop, or synchronize any one, or all, of the generating units.
- C. The GC shall be configured according to the parameters indicated in Attachment A, Genset Controller Settings Table, which is appended at the end of this Section.
- D. The GC shall control engine speed, voltage compensation, synchronization, and generator contactor operation.
 1. The GC shall perform all engine and generator safety functions. Provide annunciation through the PLC via Point I/O modules.
 2. The GC shall perform the cranking and disconnecting of the starter.

3. The GC shall turn on the run signal to the ECU then have a 5 second delay before cranking the starter to ensure fuel is up to pressure. During the delay the GC shall display a banner indicating pre-start mode.
 4. The GC shall make up to 4 attempts to start an engine with a pre-set cranking time of 10 seconds and a 10 second pause between each attempt. If the engine does not start after the fourth time, the OVERCRANK and ENGINE ALARM lamp will illuminate and a FAIL TO START message will appear on the monitoring screen.
 5. The GC shall control the engine speed using 0.5-4.5 VDC signal to the engine ECU.
 6. The GC shall control the voltage regulator through the voltage regulator auxiliary voltage bias input.
 7. Generator Lockout Switch. When in the OFF position the switch shall disable the GC and prevent engine starting.
- E. Upon activation of the dead bus relay the feeder contactor shall open. This function shall be independent of the PLC and shall operate in all modes.
- F. Manual Operating Condition. When the System Mode Switch is in the "MAN" position each generator GC shall control the respective generator in isochronous mode. The GC must be placed in MAN mode to start, stop, and control the generator. All functions shall be manually executed through the GC. If multiple generators are placed online the GC's shall proportionally share load.
- G. Automatic Operating Conditions.
1. With the System Mode Switch in the "AUTO" position and each GC in "AUTO" mode, the following sequences of operation shall be performed:
 - a. Dead-Bus Startup: All available generators shall start and come up to rated speed. The generators shall be started sequentially in order of generator number with a 15 second delay between each start signal. The first unit to stabilize will close to the dead bus. The remaining units shall auto-synchronize to that unit and close to the bus in sequence. After 15 second delay after the last generator comes on line, the PLC shall close the feeder contactor and energize the feeder. If available, a minimum of two units shall be running and synchronized prior to energizing the feeder. If only one generator is available for operation, the PLC shall use that unit to energize the feeder.
 - b. With all available units operating and all GC's in "AUTO" mode, the PLC shall monitor the bus load and determine which unit best fits the demand load. The PLC shall signal the GC to unload and shut down any unit not needed to meet the load.
 - c. When the load increases the PLC shall step up to a larger unit or add a second unit and when the load decreases the PLC shall step down according to the Demand Control System as specified below.

- d. When there are two generators of equal capacity the PLC shall provide Lead Lag control as specified below. When there are more than two generators of equal capacity the PLC shall provide Priority control as specified below.
- e. When any GC is not in “AUTO” mode, the PLC shall skip that unit and switch to the next available unit. Any time a unit’s GC is switched from “STOP” or “MAN” to “AUTO” mode, the PLC shall compare the unit with the operating unit and load to determine which unit is more appropriate for the load. If the new unit is more appropriate, the PLC shall send a command signal to the GC to start, synchronize, and connect the unit to the bus and unload and shut down the other.
- f. When one unit is operating and is dropped from the bus, for any reason, the PLC shall signal all GC’s to automatically start all remaining available units and perform a dead bus start up sequence as previously specified. After the bus is stabilized, the PLC shall resume normal demand level control operation and signal the GC’s to shut down units not required to carry the load.
- g. When two units are operating and one of the units is dropped from the bus for any reason, the PLC shall check the raise level and overload level of the unit operating. When the system demand exceeds the raise level of the operating unit, the PLC shall signal the GC to start the next unit and place it in service after the raise level time delay times out. When the system demand exceeds the overload level of the operating unit, the PLC shall immediately signal the GC to start the next unit available under the automatic demand system and place it in service within 10 seconds.
- h. The GC shall provide a programmable cool down period for each unit prior to engine shut down. Each unit shall operate at rated speed for 3 minutes, and then automatically stop the engine.
- i. When the GC of an operating unit is switched to “MAN” mode, the PLC shall signal the GC to start another unit, as specified above. The unit placed in “MAN” mode will continue to run until the GC is switched to “STOP” or placed in “AUTO”.
- j. When the GC of an operating unit is switched to “STOP” mode, the GC will check to see if any other generators are online. If there is another unit on-line, the GC will shed the load to the other unit, open the generator contactor, and shut off the engine after a cool-down period. If there is no other unit on-line, the generator contactor will open and the engine will shut off after a cool-down period.
- k. Upon normal shut down of a unit, all parameters shall be automatically reset to allow the unit to be operated again, either manually or automatically, without further reset action.

1. When the System Mode Switch is switched from the “AUTO” position to the “MAN” position while units are operating in automatic mode, the system shall continue to operate in the present state. If the Mode Switch is moved back to the “AUTO” position, the PLC shall revert to operation in the automatic demand mode.
2. Lead/Lag Control: Provide lead/lag control when there are two generators of equal capacity. The control shall allow the operator to manually select one unit to run preferentially under Automatic Demand Control. When a second unit is required or the lead unit faults, the PLC shall select the next unit in numerical order (2—3).
3. kW Load Demand Control: The automatic Demand Control System shall operate primarily based on kW load on the system. The kW Load Demand Control shall provide 2 levels of starting control and 1 level of stopping control.

The 2nd level of starting control is considered the “overload” level and it shall be equal to the generator prime power rating. When the load equals or exceeds the “overload” level the system shall immediately go to the next higher demand level.

The 1st level of starting control is considered the “raise” level and it shall normally be equal to 90% of the generator prime power rating. When the load equals or exceeds the “raise” level for 20 seconds, adjustable, the system shall go to the next higher demand level.

The stopping control is considered the “lower” level and it shall normally be equal to 80% of the generator prime power rating. When the load is less than the “lower” level for 120 seconds, adjustable, the system shall go to the next lower demand level.

The Demand Control System shall have multiple demand levels. See project design drawings for demand control settings.

4. Phase Current Demand Control: In addition to the kW Load Demand Control, the automatic Demand Control System shall provide protection against high generator phase current.

Using the bus meter amps per phase, when any phase of the bus meter current exceeds 90% of the smallest unit Breaker Rated Current setting (easygen parameter 1754 Rated Current) automatically enable the kW Load Demand Control “overload” Level 1. Once the bus meter per phase current drops below 80% of the smallest unit Breaker Rated Current setting, return to kW Load Demand Control. Note that the Over Current Load Demand Control shall only be enabled when the smallest unit is running alone.

OIU Display:

On the Demand Tab, provide “Over Current Load Demand Control” Enabled indication.

- H. Engine and Generation Alarm Conditions and Sequences. Note that these apply to both Auto and Manual operation.
1. Provide the following types of alarm sequences for each condition listed below:
 - a. Type 1 (Engine Alarm Soft Shutdown):

Upon alarm condition bring another generator on line, unload the first generator, open the generator contactor, run engine through a cool down cycle, shut down engine, and illuminate “Alarm/Lockout” light and associated alarm annunciation light. Alarm light shall remain illuminated until the problem is corrected and the GC is manually reset. Note that this a Class B Easygen alarm with PLC assist to first start another generator and then take the first generator offline.
 - b. Type 2 (Engine Alarm Hard Shutdown):

Upon alarm, immediately open the generator contactor and shut down without going through a cool down cycle. Illuminate “Alarm/Lockout” light and associated alarm annunciation light. Unit shall be locked out and alarm light shall remain illuminated until the problem is corrected and the GC is manually reset. Note that this a Class F Easygen alarm.
 - c. Type 3 (Generation Alarm):

Upon alarm, immediately open the generator contactor, run engine through a cool down cycle, shut down engine, and illuminate “Alarm/Lockout” light and associated alarm annunciation light. Unit shall be locked out and alarm light shall remain illuminated until the problem is corrected and the GC is manually reset. Note that this a Class D Easygen alarm.
 2. For the following engine/generator alarm conditions perform the sequence indicated and illuminate the associated alarm light. See Attachment A, Genset Controller Settings Table, and the project design drawings for specific alarm and shut down setpoints and time delays.
 - a. Low Oil Pressure - Provide a Type 1 soft shutdown when the oil pressure drops to the Alarm level and stays below that level for 5 seconds, or if the pressure transducer signal is lost. Provide a Type 2 hard shutdown when the oil pressure drops to the Shut Down level and stays below that level for 5 seconds.
 - b. Oil Level - Provide a Type 1 soft shutdown when the oil level switch closes.
 - c. High Coolant Temperature - Provide a Type 1 soft shutdown when the jacket water temperature reaches the Alarm level and stays above that level for 30 seconds or if the temperature transducer signal is lost. Provide a Type 2 hard shutdown when the jacket

- water temperature reaches the Shut Down level and stays above that level for 30 seconds.
- d. Over Speed - Provide a Type 2 hard shutdown when the engine speed reaches the Shut Down level.
 - e. Over Crank – Lock out engine if a unit fails to start when the over crank time delay has expired.
 - f. Running Timeout - Shut down the engine and lock it out if the engine runs without being placed online for 5 minutes, adjustable.
 - g. Battery Charger Failure – Illuminate the appropriate alarm light when an alarm is received from the battery charger. Note this alarm is for indication only and not shutdown.
 - h. Air Filter Plugged - Provide a Type 1 soft shutdown upon receipt of an air filter restriction alarm from the engine mounted switch.
 - i. High Exhaust Temperature – Illuminate the associated alarm light when the exhaust temperature reaches the Alarm level and stays above that level for 30 seconds or if the temperature signal is lost. Note this alarm is for indication only and not shutdown.
 - j. Fail to Synchronize - Provide a Type 3 shutdown if a unit fails to synchronize after the preset time delay.
 - k. Over Current - Provide a Type 3 shutdown on operation of an overcurrent element. See the project design drawings for the trip setpoint for each generator.
 - l. Under Voltage - Provide a Type 3 shutdown when the voltage reaches the Shut Down level and stays below that level for 5 seconds.
 - m. Over Voltage - Provide a Type 3 shutdown when the voltage reaches the Shut Down level and stays above that level for 5 seconds.
 - n. Under Frequency - Provide a Type 3 shutdown when the frequency reaches the Shut Down level and stays below that level for 5 seconds.
 - o. Over Frequency - Provide a Type 3 shutdown when the frequency reaches the Shut Down level and stays above that level for 5 seconds.
 - p. Reverse Power - Provide a Type 3 shutdown when the reverse power reaches the Shut Down level and stays above that level for 5 seconds.
3. For the following system alarm conditions perform the sequence indicated and illuminate the associated alarm light:
- a. Fire Alarm - Upon receipt of a contact closure from the fire suppression system, all engines shall be shut down immediately

without going through a cool down sequence. The system shall remain in a lockout condition and no units shall be started either manually or automatically until the alarm is cleared.

- b. Emergency Stop - Upon receipt of a contact closure from the Emergency Stop Pushbutton, all engines shall be shut down immediately without going through a cool down sequence. The system shall remain in a lockout condition and no units shall be started either manually or automatically until the alarm is cleared.
 - c. Low Coolant Level – Opening of the low coolant alarm contact on the system low coolant level switch, all engines shall be shut down immediately without going through a cool down sequence. The system shall remain in a lockout condition and no units shall be started either manually or automatically until the alarm is cleared.
 - d. Low Fuel Level - Opening of the low fuel alarm contact on the day tank control panel (separate external panel) indicates a low fuel level condition. The low fuel level indication shall start a time delay relay, 2 hours, adjustable, and illuminate the alarm lamp. If the fuel level has not been corrected by the end of the timed interval all engines shall go through a Type 1 soft shutdown and the alarm lamp shall remain illuminated. The manual alarm reset button on the front of the switchgear master section will reset the timer relay for another interval and place the engines back in service if timed out. The reset function shall work any time during or after expiration of the timed interval.
 - e. PLC/ Point I/O Failure - Upon failure of the PLC or the Point I/O network, the alarm light shall remain illuminated until the system is back in acceptable service.
 - f. System Not In Auto – When the System Mode Switch is changed from Auto to Manual the alarm lamp shall illuminate. The alarm lamp shall remain illuminated until the Mode Switch is switched back to Auto.
 - g. Feeder Breaker Trip – Upon over current, the feeder breaker shall trip and the alarm lamp shall illuminate. The generator shall continue to operate at rated speed.
- I. Engine Service Alarm Conditions and Sequences. Note that this applies to Auto operation.
1. When an engine exceeds 250 service hours perform the sequence indicated below:
 - a. The Engine “Alarm/Lockout” annunciator is illuminated.
 - b. The “Service Engine” annunciator is illuminated
 - c. Demand control starts the next available engine, syncs it to the bus, closes the contactor, and transfers load.

- d. A Type 1 shutdown is performed on the engine with service overdue.
- e. Upon completion of the required engine service the operator shall press and hold the Service Hours Reset pushbutton for 10 seconds to reset the service interval to 250 hours. The operator shall then press the Alarm Reset pushbutton to clear the engine alarm. Once the service is complete and the alarm is cleared the operator shall put the engine back into Auto mode.
- f. Note: If the required engine service is performed manually prior to the Engine Service Alarm condition, the operator shall follow the procedure above without alarm condition in order to reset the service interval to 250 hours and place the engine back in service.

4.9 FEEDER SEQUENCE OF OPERATION

- A. Automatic Operation - When the System Mode Switch is in the "AUTO" position the feeder contactor shall operate under control of the PLC. The feeder contactor can be opened at any time by rotating the feeder control knob to the OPEN position. The PLC shall then perform a dead bus start sequence (start all available generators) and re-close the feeder contactor after the pre-set time delay.
- B. Manual Operation - When the System Mode Switch is in the "MAN ISOCH" position and the bus is energized, the feeder contactor will operate under manual control. The feeder contactor shall close when the feeder control knob is rotated to the CLOSE position and open when the feeder control knob is rotated to the OPEN position.
- C. Overcurrent - When an overcurrent condition occurs the internal trip element on the feeder breaker shall operate and a Feeder Breaker Trip alarm shall be indicated.

4.10 VFD SEQUENCE OF OPERATION

- A. General VFD Sequence of Operation. Each variable frequency drive shall operate as follows:
 1. When the VFD main circuit breaker is closed and the selector switch is in either the "VFD" or "BYPASS" position, power shall be provided to all control devices. Time delay shall be incorporated into the fault alarm such that there is no alarm due to initial powering up of the VFD.
 2. When the VFD main circuit breaker is open, the red "VFD Breaker Open" lamp shall illuminate and remote indication shall be provided to the PLC.
 3. When the 3-position selector switch is in the "OFF" position, the motor will not operate and power to all control devices will be off.
 4. When the 3-position selector switch is in the "Bypass" position, the motor shall operate at full speed and the "Bypass Mode" light shall be on. The VFD will not be in service and the contactor will be open. Provide remote indication that the VFD is in bypass mode from an auxiliary contact as indicated.

5. When the 3-position selector switch is in the "VFD" position, the motor shall operate under control of the VFD and the "VFD Mode" light shall be on. Upon receipt of a run signal the contactor shall close, the motor shall operate, and the "VFD Running" light shall be on.
 6. Upon a fault of the VFD the red "VFD Fault" lamp shall illuminate and remote indication shall be provided to the PLC. Placing the selector switch in the "OFF" position shall clear the fault alarm indication.
 7. Upon activation of the thermal overload, the VFD main circuit breaker shall trip, the red "VFD Breaker Open" lamp shall illuminate and remote indication shall be provided to the PLC.
 8. Engine Coolant Return High Temperature Alarm. When the engine coolant return temperature rises above 190°F for a minimum of 2 minutes, the "HIGH COOLANT RETURN TEMPERATURE" lamp shall illuminate. Lamp shall remain on until master reset button is pressed
- B. Radiator Sequence of Operation. Each variable frequency drive for glycol coolant radiators shall operate as follows:
1. The remote temperature sensor will sense Coolant Return Temperature and send a 4-20mA signal to the VFD where 20°F equals 4 mA and 240°F equals 20 mA. The operating temperature setpoints shall be adjustable through the OIU and scaled to display in °F.
 2. When the Coolant Return Temperature reaches the PID Reference Temperature setpoint the motor will start at minimum speed and ramp up to the required speed.
 3. Using its internal PID control, the VFD will modulate the fan speed as required to maintain Coolant Return Temperature at the PID Reference Temperature setpoint. As the Coolant Return Temperature rises, the VFD will increase the speed of the fan motor up to 100%. Once the fan reaches the Minimum Speed, the VFD will maintain that speed until the Low Speed Time Out expires.
 4. When the Low Speed Time Out expires the motor will stop. The motor will remain off until the Coolant Return Temperature rises to the Wake Up Temperature setpoint.
 5. Configure the OIU to display the fan speed in percentage and the PID Reference Temperature setpoint and Coolant Return Temperature in °F.
 6. The operating settings shall be set to the values on the project design drawings and shall be adjustable.

4.11 HEAT RECOVERY SEQUENCE OF OPERATION

- A. The PLC shall perform the following functions. Note that all heat recovery alarms shall be tied to the dead bus signal to prevent alarm indication when the power system is off-line:

1. Heat Recovery No Load Warning. When the heat recovery return temperature is greater than the heat recovery supply temperature for a minimum of 1 hour, the “NO LOAD ON HEAT RECOVERY” lamp shall illuminate. When the heat recovery supply temperature is a minimum of 1°F greater than the heat recovery return temperature the lamp shall turn off.
2. Signal Loss. If either the supply temperature or the return temperature signal is lost, the system shall provide the following message on the OIU “HEAT RECOVERY SUPPLY TEMPERATURE SIGNAL LOST” or “HEAT RECOVERY RETURN TEMPERATURE SIGNAL LOST”.
3. Heat Recovery Loss of Pressure Alarm. When the heat recovery system pressure drops below 15 PSIG for a minimum of 15 minutes, the “HEAT RECOVERY LOSS OF PRESSURE” lamp shall illuminate. When the pressure rises above 18 PSIG the lamp shall turn off.
4. Heat Recovery Loss of Flow Alarm. When the heat recovery system flow rate drops below 10 GPM for a minimum of 15 minutes, the “HEAT RECOVERY LOSS OF FLOW” lamp shall illuminate. When the flow rate rises above 15 GPM the lamp shall turn off.
5. Recovered Heat Output. The PLC shall calculate the instantaneous rate of energy delivered based on the supply temperature, return temperature, and flow rate. A specific heat of 450 BTUH/GPM-F shall be used for the fluid.
6. Total Recovered Heat Delivered. The PLC shall calculate the total energy delivered in units of 100,000 BTU with no decimal places.
7. History. The PLC shall maintain a running total of energy delivered.

SEE ATTACHMENT A - GENSET CONTROLLER SETTINGS TABLE

Alarm Classes		Type 1 = Class B (Warning)							Tuluksak - EasyGen Startup Setting Parameters
		Type 2 = Class F (Open GCB & Immediate Shutdown)							Engine Speed Source = ECU/J1939
		Type 3 = Class D (open GCB & cool down)							
Home Screen data: Engine		RPM, Engine Hours, Oil Pressure, Battery Voltage, Coolant Temperature							
: Generator		Volts, Power (kW), Freq, PF, AMPS - L1, L2, L3							
Custom Screen 1		Contractor Discretion							
Custom Screen 2		Contractor Discretion							
Configure frequency control		freq ctl init state	proportional gain	integral gain					
Frequency Control Initial State		0.5	1	1	default settings: 5508=0.50; 5510=1; 5511=1.0				
Configure Active Power Load Share									
Active Power Load Share		5531	ON	5531: ON					
Active Power Load Share Gain		4522	1.25	default setting: 4522 = 1.25					
Configure general engine		Time	Ign delay	Vlv delay	S/S mode	Pre-mode			
Preglow		5	5	5	Diesel	ALWAYS	powers up ECM 5 seconds before cranking to prime fuel system		
Configure Analog Inputs		Input	Type	Value	Sender	Self Ackn	Unit	Class*	
Exhaust Temp		1	Linear	70-1400	0-20mA	No	F	B	* Monitor: High/Low, Wire Break/Signal Loss
Air Filter		2	Linear	408-0	0-20mA	No	W/C	B	Exhaust RTD, Alarm Only No Shut Down
Intake Air Temp		3	Linear	40-240	0-20mA	No	F	B	Not Used - See Discrete Input 6
Configure Analog OUTputs		Type	Filter	Src Min	Src Max	Min Lvl	Max Lvl	PWM lvl	
Speed Bias Analog Output 1		V	Off	0	100	0.5	4.5	10V	Woodward EPG Bias: +/- 3V
Voltage Bias Analog Output 2		V	Off	0	100	-3	3	10V	Confirm: DEC Voltage Regulator (+/- 10V)
Configure Discrete Inputs		Input	Delay	Contact	Class	Enabled	Self Ackn		
E-Stop		1	0.2	N.O.	F	Always	No	OK	
Start in Auto		2	0.5	N.O.	Control	Always	No	OK	
Oil Level Switch (Alarm)		3	5	N.O.	B	Always	No	OK	
Oil Level Switch (SD)		4	100	N.O.	F	Always	No	DI4 Jumpered to DI3: DI3 is Alarm, DI4 is Oil Level Shutdown	
Stop Mode Lockout Switch		5	0.5	N.O.	F	Always	Yes	when stop switch set to RUN, easygen remains in STOP Mode	
Idle Mode/Spare/VFD Fault/Air Filter		6	0.5	N.O.	B	Always	No	Air Filter Switch Input	
MCB Open Reply		7	0.5	N.O.	Control	Always	No	DI7 Jumpered for Islanded System	
GCB Open Reply		8						--	
Remote Acknowledge		9	0.2	N.O.	Control	Always	No	OK	
Spare or Base load		10	0.2	N.O.	Control	Always	No	SPARE - NOT USED	
PLC E-Stop / Master Shutdown		11	0.2	N.O.	F	Always	No	SPARE - NOT USED	
Run w/o Load or spare		12	0.2	N.O.	Control	Always	No	SPARE - NOT USED	
Configure Discr Outputs (relays)		Relays Use Program Logic							
		Relay 5 used for OC 2&3 to Shunt Trip Breaker. Contactor Opened for all OC's							
		NOT USED							
Configure external discrete Inputs		Delay	Contact	Class	Enabled	Self Ackn			
Alarm Reset		1	0.05	N.O.	Control	Always	No	used for door-mount pushbuttons to provide easygen input.	
Air Filter Shutdown		2	60	N.O.	B	Always	No	IKD Input 1 resets EasyGen alarms	
Engine Service Alarm		7	0.05	N.O.	B	Always	Yes	IKD Input 2 performs Type 1 shutdown for plugged air filter IKD Input 7 performs Type 1 shutdown for Engine Service interval	
Configure Ctrs/Service Reset value		250							
		Oil Change Service Interval 250 hours							
Configure Interfaces/CANopen		used with IKDs							
General CAN1 settings		1894 = YES							
		15320 Select ext terminals; set to 1IKD							
		8950 CAN1 Node Address = Device Node ID 1702							
Configure Measurement									
Busbar / configure transformer		480V	10%	120V	480V	Confirm Bus PTs are 2.4:1			
Engine		1800 rpm			1752/1758: G1=150kW/113kVAR; G2&3=210kW/158kVAR; G4=310kW/233kVAR				
Generator		See Notes			L1 L2 L3	480V	1754: G1=250A; G2&3=325A; G4=500A		
Configure transformer		200V	480V	See Notes		Confirm PTs are 2.4:1; 1806: G1=300:5; G2&3=400:5; G4=500:5;			
Mains		See Notes			Phase L1	480V	1748 = 880kW, 1746 = 660kVAR, 1785 = 1233A		
Configure transformer		200V	480V	See Notes		1803: Confirm PT is 2.4:1; 1807: CT = 800:5			
Configure Monitoring		Monitor	Class	Atmp/Ack	Time	Limit	Enabled		
Configure GCB		ON	B	5 tries	2s	--	--	Default Setting	
Configure MCB		OFF						OFF - NOT USED	
Configure Synch GCB		ON	D	No	60s	--	--	Class D, 60s to 180s, max	
Engine/Overspeed Level 2		ON	F	No	0.5s	1900rpm	Always	Delay = 0.5s	
Engine/Speed Detection		ON	E	No	1s	--	Eng.mon	87.70 LM:Eng.mon	
Engine/Start/Stop/SD malfunction		ON	F	No	30s	--	--	Default Setting	
Engine/Start/Stop/Start Fail		ON	F	No	--	--	--	Default Setting	
Engine/Start/Stop/Unintended stop		ON	F	No	--	--	--	Default Setting	
Config Monitoring Flexible Limits		Input	Monitor	Class	Self Ackn	Enabled	Monitor	Limit	Delay
Exhaust Temp SD		1	OFF	F	No	Always	Overrun	950F	30
Exhaust Temp Alarm		2	ON	A	No	Always	Overrun	900F / 482C	30
Air Filter Restriction SD		3	OFF	F	No	Always	Underrun	20" WC / 1.47" Hg	30
Air Filter Restriction Alarm		4	OFF	B	No	Always	Underrun	15" WC / 1.10" Hg	60
High Intake Air SD (CAC)		5	OFF	F	No	Eng.mon	Overrun	150	30
High Intake Air Alarm (CAC)		6	OFF	B	No	Eng.mon	Overrun	140	30
Low Oil Pressure SD		7	ON	F	No	87.70 LM:Eng.mon	Underrun	10PSI/69kPa	5
Low Oil Pressure Alarm		8	ON	B	No	87.70 LM:Eng.mon	Underrun	14.5PSI/100kPa	5
High Coolant Temp SD		9	ON	F	No	Always	Overrun	215F / 102C	30
High Coolant Temp Alarm		10	ON	B	No	Always	Overrun	210F / 99C	30
Running Timeout		11	ON	F	No	Always	Overrun	300s	1
		setpoints may be either Metric or ANSI units							
Config Monitoring Generator		Monitor	Class	Self Ackn	Enabled	Limit	Delay (sec)	Rest / Hyst	
Current/OC Level 1		--	ON	D	No	Always	100%	60	No
Current/OC Level 2		--	ON	D	No	Always	120%	30	No
Current/OC Level 3		--	ON	D	No	Always	250%	1	No
Frequency/OF Level 2		--	ON	D	No	Always	103%	5	--
Frequency/UF Level 2		--	ON	D	No	Eng.mon	97%	5	--
Operating Ranges		--	OFF	--	--	--	--	--	OFF - NOT USED
Other Monitoring/Phase rotation		--	ON	F	No	Always	--	--	CW
Other Monitoring/Power factor		--	OFF	--	--	--	--	--	Default Setting
Power/Load Share		--	OFF	--	--	--	--	--	OFF - NOT USED
Power/Overload		--	OFF	--	--	--	--	--	OFF - NOT USED
Power/Power Mismatch		--	ON	B	No	5%	30	--	OFF - NOT USED
Power/Gen Unloading mismatch		--	ON	B	No	5%	60	--	60s min delay, 180s max delay
Power/Rev / Reverse power level 2		--	ON	D	No	Always	-10%	5	OK
Power/Unbal Load		--	OFF	--	--	--	--	--	OFF - NOT USED
Power/Volt/OV Level 2		--	ON	D	No	Always	110%	5	OK
Power/Volt/UV Level 2		--	ON	D	No	Eng.mon	90%	5	OK
Mains		OFF??							
Miscellaneous/Free Alarms		Alarm	Class	Self Ackn	Enabled	Monitor	Delay		
Oil Level AL		1	B	No	Always	Disc Inp-3	5	OFF - NOT USED	
Oil Level SD		2	F	No	Always	Disc Inp-3	100	OFF - NOT USED	
Miscellaneous/Interfaces		Monitor	Class	Self Ackn	Enabled	Delay			
CAN Interface 2		--	ON	B	Yes	Always	0.2	16187 CAN2 Monitoring (ON for IKDs)	
J1939 Amber Alarm		--	OFF	A	No	Always	2	15120 J1939 Monitoring (ON for ECU)	
J1939 DM1 alarms		--	OFF	--	Yes	--	--	15156 J1939 Monitoring (ON for ECU)	
J1939 Interface (Device 1-3)		--	OFF	--	--	--	--	1919 Monitoring - NO USED	
J1939 ECU Monitoring		--	OFF	A	Yes	Always	1	15172 J1939 CAN Message Monitoring (On for ECU)	
J1939 Protect Alarm		--	OFF	A	No	Always	2	1914 ECU Protect Lamp Monitoring (ON for ECU)	
J1939 Red Alarm		--	OFF	F	No	Always	2	15115 Monitoring (ON for ECU)	

SECTION 26 23 05

SCADA SYSTEM FOR PRIME POWER SWITCHGEAR

PART 1 - GENERAL

1.1 SCOPE

- A. The Work consists of providing a complete and operational Supervisory Control and Data Acquisition (SCADA) and Historical Trending system, as specified herein. The SCADA system shall be provided by an experienced programmer, referred to as Developer.
- B. The Developer shall develop the SCADA system and programming for the Human Machine Interface (HMI), referred to herein as Operator Interface Unit (OIU), data storage server, and local and remote devices. The SCADA system shall include Supervisory and Trending application software, custom project software file(s), and other software and files required to make a complete and fully functional system.
- C. The Developer shall provide all labor, equipment, incidentals and resources as specified and needed to furnish, program, install, calibrate, test, start-up and commission, and place into service a complete SCADA system, as indicated herein.
- D. The Authority and Utility, herein referred to as Designee(s), shall maintain ownership and use of all custom project software files and documentation developed to meet the requirements of this solicitation. All SCADA Supervisory and Trending application software licenses provided under this solicitation shall include the legal right for the Authority and its Designee(s) to use the software for an indefinite period of time without additional cost (perpetual license). The Authority and its Designee(s) shall have unlimited rights to install and operate the SCADA Supervisory and Trending application software, up to the number of software licenses issued, and to install, operate and modify the custom project files as needed, without the requirement to commit to on-going maintenance or service agreements.
- E. The Developer shall fully test the SCADA system with the switchgear and generating equipment as specified herein and in Section 26 23 02 - Upgrade Existing Prime Power Switchgear.
- F. In addition to the specified requirements for SCADA system programming, testing, commissioning, and warranty work, during the one-year warranty period the Developer shall provide an additional twelve (12) hours of programming assistance and technical support to modify the SCADA as requested by the Authority or its Designee(s). These hours are in addition to any technical requirements specified for programming, start-up, and commissioning efforts, and shall be included in the Developer's bid price. The programming assistance and technical support may be required to be provided at a single event or may be spread out over the year as directed by the Authority or its Designee(s), and will be performed remotely from the Developer's office and not at the Utility location.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 00 Common Work Results for Electrical
- B. Section 26 05 02 Basic Electrical Materials and Methods
- C. Section 26 23 02 Upgrade Existing Prime Power Switchgear

1.3 SUBMITTALS

- A. Provide submittals in accordance with Section 26 05 00 Common Work Results for Electrical and Division 1.
- B. Submit data sheets and catalog data showing all supplied features, options and configurations of the SCADA Supervisory and Trending application software. Include SCADA platform version, and Visualization, Drivers and Trending modules.
- C. Submit specific software operating system and version, and quantity of licenses for each of the following: OIU, data storage server, local and remote devices, and SCADA Supervisory and Trending application.
- D. Provide a written narrative that describes the purpose and function of each device and the method of communication, i.e., LAN/EtherNet/ModbusTCP/CAN BUS/etc.
- E. Provide a written narrative that describes the methods/protocols available to access the SCADA system both on the local area network (LAN) and remotely via the internet wide area network (WAN), and how many users may simultaneously access the SCADA system (LAN and WAN).
- F. Provide a written description of the SCADA system security encryption and authentication protocol.
- G. Submit screen shots of the proposed OIU screen custom project file(s). Provide a Tag list and narrative operating description of the project file(s).

1.4 SCADA SYSTEM SOFTWARE

- A. All SCADA Supervisory and Trending application software licenses and custom project files, as well as upgrades and maintenance described in the Warranty herein, shall be included in the Developer's bid price. The SCADA and Trending system shall use non-proprietary software and have integrated real-time monitoring with Alarm and Historical graphing.

For the purpose of this solicitation the SCADA Supervisory application software is defined as:

- Machine-readable object code used for the supervision, control and monitoring of the programmable logic controller (PLC) and other switchgear and field devices. The Supervisory application software interacts with custom project file(s) that are configured and customized to display and control tags from the PLC and devices, as indicated in Section 26 23 02 - Upgrade Existing Prime Power Switchgear.

For the purposes of this solicitation the SCADA Trending application software is defined as:

- Software that provides the functions as described in Paragraph 2.2 - Trending
- B. For the SCADA system to function both the Supervisory application software and custom project files shall be installed on a client device. A client device shall include, but not be limited to, devices that operate on Windows 10, Windows 11, Windows Enterprise IoT 2016 or later, and excludes any Windows-based Server.
- C. The Authority and its Designee(s) shall be able to upgrade the Supervisory and Trending application software and to edit, modify, change, and manipulate the custom project files to fit their requirements.
- D. The Authority shall own outright all other software applications and files developed under this solicitation by the Developer without license and shall have full rights to the files and programming code and may distribute, modify, or install it on any number of computers that may be owned by the Authority or its Designee(s) without additional costs or fees, up to the number of software licenses issued.
- E. For the purposes of this contract “other software applications and files” shall include but may not be limited to:
- Customized screens and parameters developed for use with the Supervisory and Trending application software. (i.e., custom project files).
 - Any other software and interfaces developed between the Supervisory and Trending application software, custom project files, and other application software and files related to collecting and reporting power plant data via the SCADA system.

1.5 QUALITY ASSURANCE

- A. The Developer is responsible for quality assurance and completion of all work identified in these specifications. All work shall be subject to evaluation and inspection by the Authority at all times to ensure satisfactory progress, and to verify that work is being performed in accordance with the specifications.
- B. The SCADA system shall be furnished by a single Developer who shall assume all responsibility for providing a complete and integrated SCADA system.

1.6 DEVELOPER QUALIFICATIONS

- A. The SCADA system shall be the product of a Developer who can demonstrate at least five (5) years of continuous satisfactory experience in designing, implementing, furnishing and installing comparable SCADA systems for remote installations.
- B. The Developer shall have a thorough working knowledge of remote, off-grid prime power electric power plant controls and operating practices.
- C. A list of five prior projects that key staff have worked on may be requested by the Authority after the bid opening and prior to award in order to verify Developer qualifications. The list shall include installation date, description of installation, and a reference contact for each installation.

1.7 DEVELOPER WARRANTY

- A. The Developer shall warrant the work for a period of not less than one-year. The warranty period shall commence upon acceptance by AEA of field testing with the engine generators and final commissioning of the equipment.
- B. In the event of a failure of the system to perform all specified functions during the warranty period, the Developer shall promptly repair or replace any defective components and revise programming and settings as required to achieve full system function. The Developer shall assist the Authority as directed in determining causes of deficiency or failure.
- C. The Developer shall Provide additional programming assistance and technical support during the one-year warranty period as previously specified.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. See Section 26 23 02 - Upgrade Existing Prime Power Switchgear.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Developer shall provide a fully functional SCADA system as specified herein and to meet the requirements of Section 26 23 02 - Upgrade Existing Prime Power Switchgear.
- B. The SCADA system shall be compatible with the switchgear hardware.
- C. The SCADA system may depend on external hardware or software for program setup, activation, and periodic automatic software updates, but shall not require or be dependent on internet access to function properly on the power plant LAN.
- D. The Supervisory system shall operate on the specified Data Storage Server and read information directly from the PLC, and switchgear and power plant devices via the power plant LAN.
- E. The Supervisory system shall not be dependent on connectivity to the internet or to any Windows-based server to function properly.
- F. The SCADA system shall be accessible via remote and local devices operating on Microsoft Windows 10 or 11 operating systems.
- G. The Trending software shall be fully integrated into the Supervisory program. Separate Supervisory/Trending programs are not acceptable. Inductive Automation or approved equal with the following minimum components:
 - 1. Ignition 8.1 Platform and Drivers.
 - 2. Vision Module Unlimited.
 - 3. Tag Historian Module.
- H. Multiple applications of the SCADA system shall run concurrently. The OIU screens, alarms and monitoring points shall be identical for all SCADA applications, regardless if accessed locally or remotely via the internet. The Developer shall provide a sufficient quantity of SCADA and Trending application

software licenses such that all devices in the power plant, and no less than three (3) additional remote (via WAN) and/or local (via LAN) devices, shall be authorized to access the SCADA system concurrently (5 software licenses, minimum).

- I. The Supervisory and Trending application software and custom project file(s) shall be relatively small in size and have a simple installation routine. The SCADA system and software installation shall tolerate low throughput and high latency connections.
- J. The OIU graphic interface shall be user friendly and have the capability without modification or setup to allow personnel with large fingers to use the touch screen without a mouse or keyboard.
- K. The Supervisory system shall start and stop engines, reset alarms, change demand levels and have a confirm action dialog box for critical functions.
- L. The Supervisory system shall maintain a log for all Warning Alarms and Shutdowns, refer to Alarm History Screen.
- M. The Developer shall maintain a secure FTP or web site with custom project files. Tag lists, installation and operating instructions, and other files necessary to install and operate the SCADA system, readily available to be downloaded and installed.
- N. The Developer shall provide comments in the code that describe the function of each parameter for ease of future maintenance and changes.
- O. The SCADA system installation, setup and modification shall be capable of being performed remotely via internet access.
- P. Provide secure encryption with password protection.
- Q. Note that final permanent internet service will be provided by others as part of the field installation. The internet service will be Starlink Standard Gen3 with business local priority 50GB plan. It will have the following performance characteristics: 40 MBPS download, 10 MBPS upload, 50 GB priority monthly data limit. The Starlink account IP policy will be configured to "Public IP" and "Bypass Mode" will be enabled. The switchgear remote access and SCADA shall be configured to be fully compatible with the Starlink service.

2.2 TRENDING

- A. The Developer shall provide, configure, test and implement a historical database on the switchgear data storage server for historical data (tag) archiving, analysis, reporting, trending and system back-up of ALL data presented by the SCADA system. All historical data shall be fully synchronized and time-stamped, using a single time series (clock), so that historical data from all monitored devices are compared to a single time series. The time and date shall be displayed on the SCADA Status tab.
- B. The SCADA system shall include features for the management of historical data. The SCADA system shall record historical values of analog variables on a periodic basis (minimum 1 second interval) and values of digital variables on an event basis (change of state). The historical database must be capable of storing a minimum of one (1) year of historical data. All historical data shall be recorded on the

switchgear data storage server. Historical files more than one (1) year old shall be automatically deleted.

- C. Trending data from the historical database shall be displayed graphically on the SCADA Trending tab. Graphical data shall be available for all SCADA tags, and be accessible and exportable both locally and remotely via the internet WAN. The section of the trend to be exported shall be selectable by clicking and dragging the mouse across the trend, or by manually adjusting the start and end time of the selected data. Any portion of the historical database shall be exportable. Data shall be exported to CSV or TXT formatted files, or similar file system as approved by the Authority. Exported files shall be of a manageable size compatible with the internet requirements of Paragraph 2.1. Exported trend data shall be readily capable of being printed or plotted to Adobe pdf format or to a designated printer.
- D. Refer to Paragraph 3.4, Trending Application Tags, for representative example of historical data to be archived and available for trending.

2.3 SECURITY

- A. Password Protection. Provide at a minimum the following access password protection:
 - 1. Viewing only. In this level of access the viewer will be able to view the SCADA system but will not be able to modify any file or setpoint. Note remote WAN access shall be limited to Viewing only.
 - 2. Local Operator. This level of access is for the local power plant operator. The operator will be able to change the demand levels and timers, change the lead generators, remote start and stop engines, and perform other functions as directed by the Authority. Note local Operator access shall be restricted to LAN access only. The Local Operator password shall be automatically entered each time the OIU/SCADA starts/reboots.
 - 3. Administrator. This level of access is for SCADA Programming, the viewer will be able to control and change all SCADA features and functions.
- B. The Developer shall provide a description of the SCADA system security encryption and authentication protocol for review and approval.
- C. The Authority will provide a list of usernames and passwords for the Developer to install on the system.
- D. The Authority will provide a list of I.P. Addresses and Subnet Masks for the Developer to assign to all devices on the LAN.

PART 3 - EXECUTION

3.1 SHOP TESTS

- A. Prior to shop testing of the switchgear, the SCADA Supervisory system shall be fully functional as specified in Section 26 23 02 - Upgrade Existing Prime Power Switchgear.
- B. The switchgear control system shall be tested using the SCADA Supervisory system as specified herein.

- C. The OIU shall be fully functional and the switchgear shall be tested using the OIU. All alarm, indication, and control functions specified shall be available and indicated on the OIU.
- D. The SCADA Trending application shall be shop tested to the extent practicable. Refer to Section 01 11 13 – Summary of Work for functional testing and commissioning requirements.

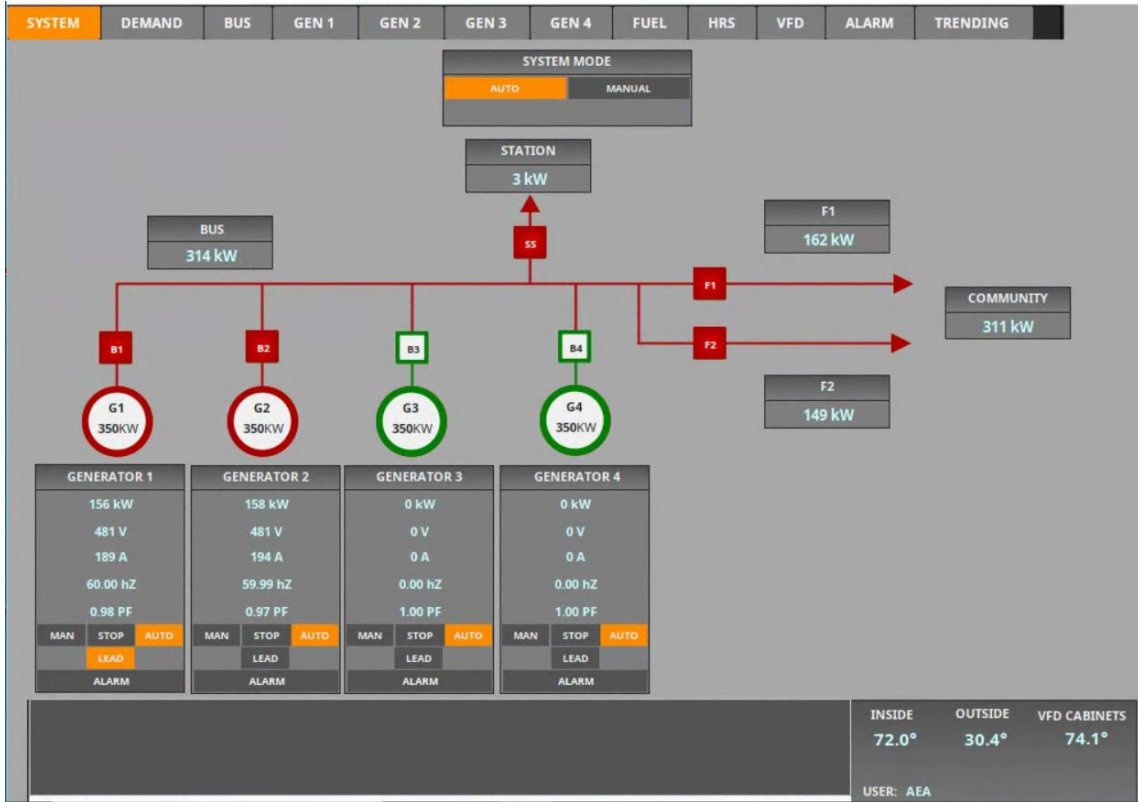
3.2 CUSTOMER TRAINING

- A. The Developer shall provide a minimum of 8 hours of training for the Authority and Utility personnel, and is in addition to the 12-hours of programming assistance in 1.1.F.
- B. Training shall occur after substantial completion of the project using the actual power plant equipment. Coordinate with the Authority and Utility to ensure that the appropriate individuals are available.
- C. During training, make modifications to the SCADA system programming as directed by the Authority to incorporate any system control modifications identified during testing, start-up, or commissioning.

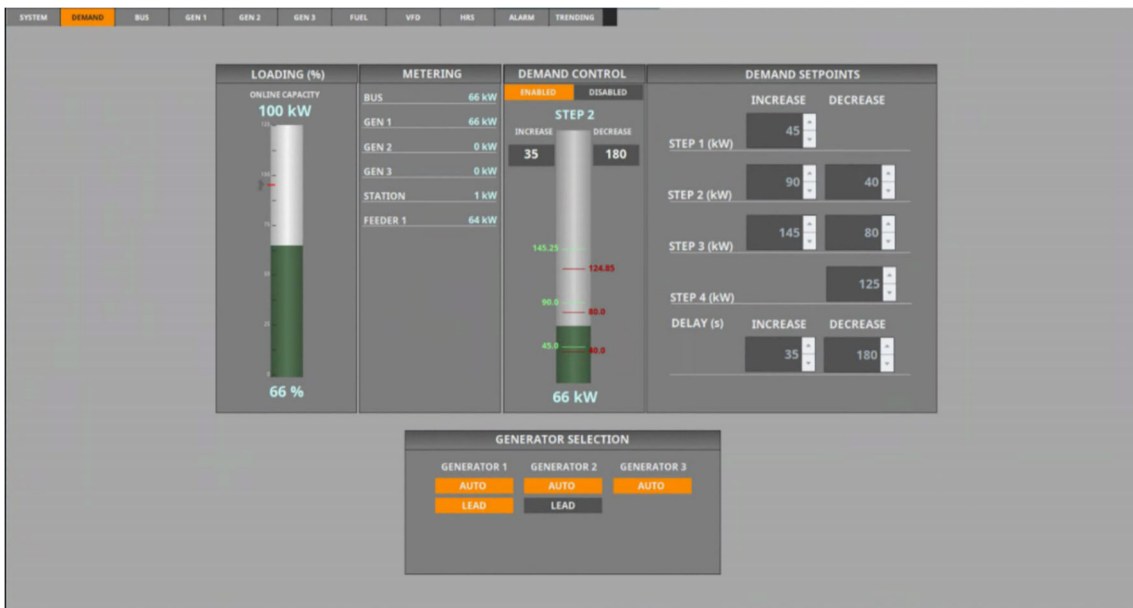
3.3 OIU SCREEN IMAGES

The SCADA system screens shall display all data as specified in Section 26 23 02 - Upgrade Existing Prime Power Switchgear. At a minimum, the Developer shall provide screens similar to the images shown in the following paragraphs. The screen images are representative of the minimum data required and the desired format. The screens shall be identical whether accessed from the Master Section OIU, local PC's/Devices connected to the LAN, or remote PC's/Devices connected via the internet.

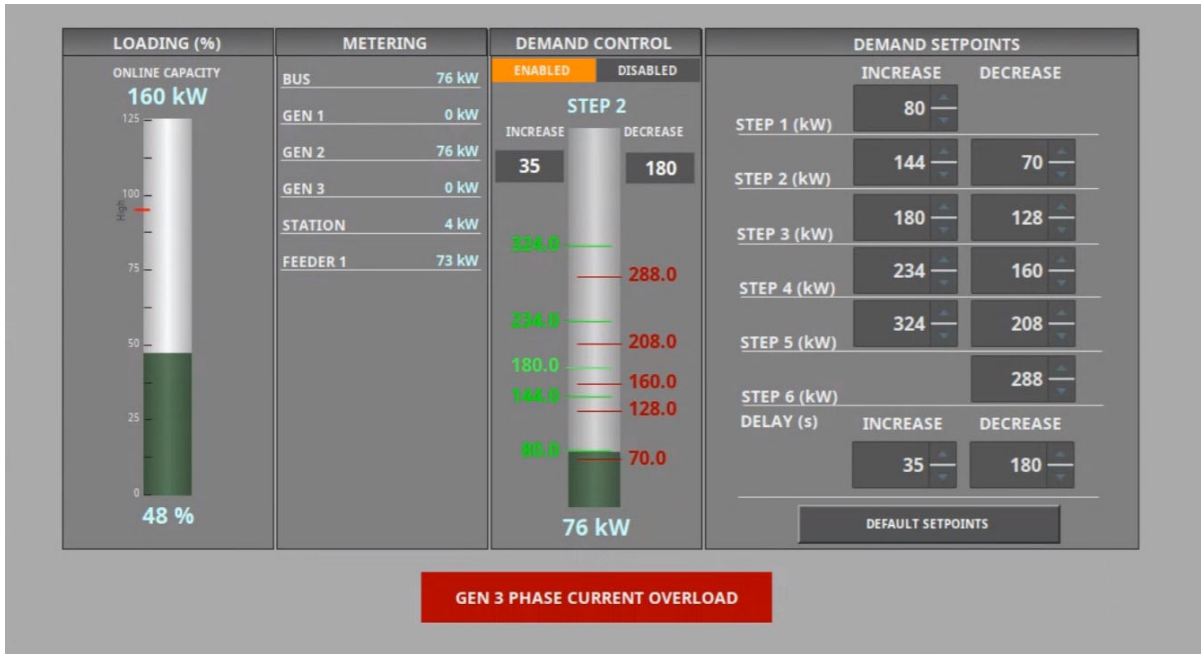
A. Home Screen – Overall Plant Status:



B. kW Demand Control Screen:



C. Over Current Demand Control Screen:



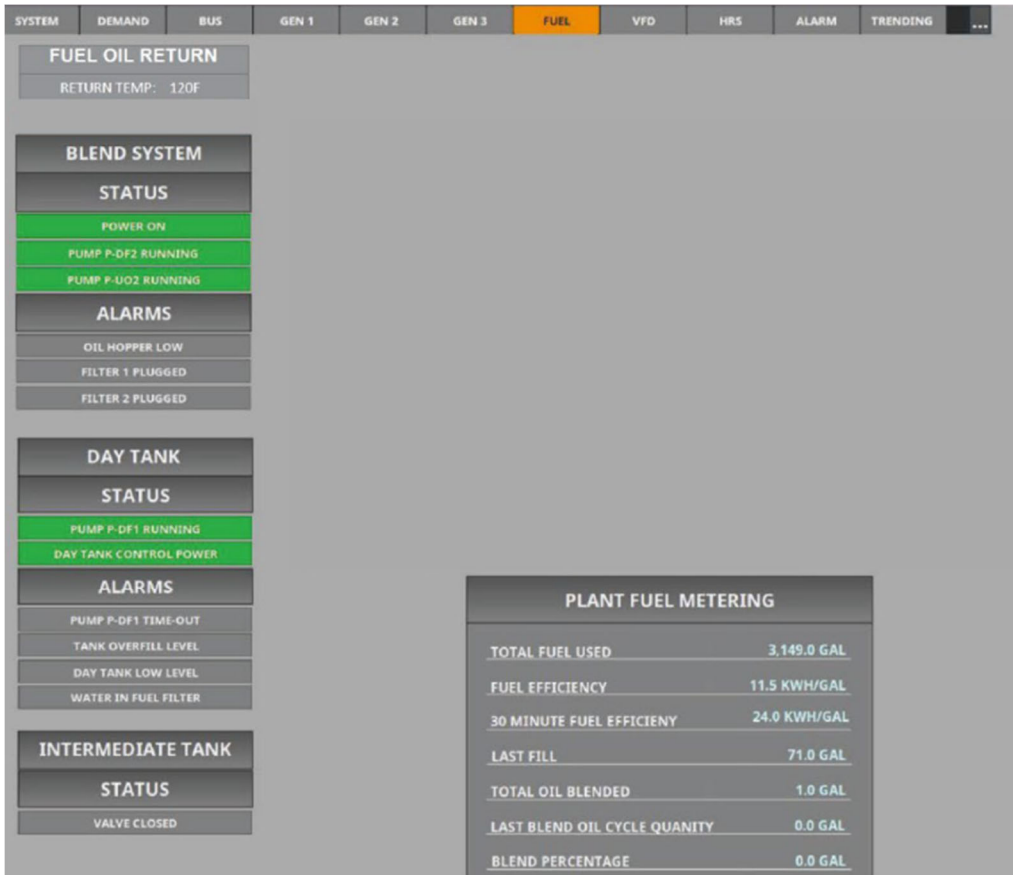
D. Bus/Master Monitoring & Metering Screen:



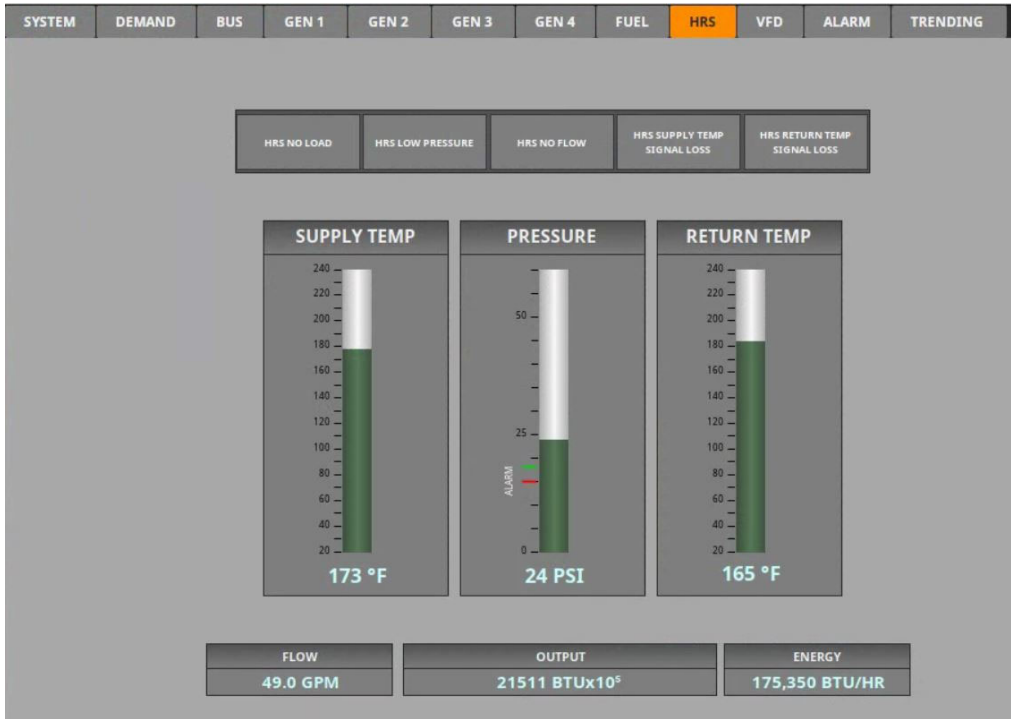
E. Engine-Generator Screen (for engines without charge air cooler):



F. Fuel System Monitoring & Alarm Screen:



G. Heat Recovery Monitoring & Metering Screen:



H. Variable Frequency Drive (VFD) Monitoring Screen:



- I. Alarm History Screen: Provide an Alarm History Screen for all Warning Alarms and Shutdowns delineated as follows:
 1. Warning Alarms shall include all Type 1 Engine Soft Shutdown Alarms and the following Master Section Alarms: Low Fuel Level, PLC/ Point I/O, System Not In Auto, and Feeder Breaker Trip. Warning Alarms shall be yellow.
 2. Shutdowns shall include all Type 2 Engine Hard Shutdowns; all Type 3 Generation Shutdowns; and the following Master Section Shutdowns: Fire Alarm, Emergency Stop, and Low Coolant Level. Shutdowns shall be red.

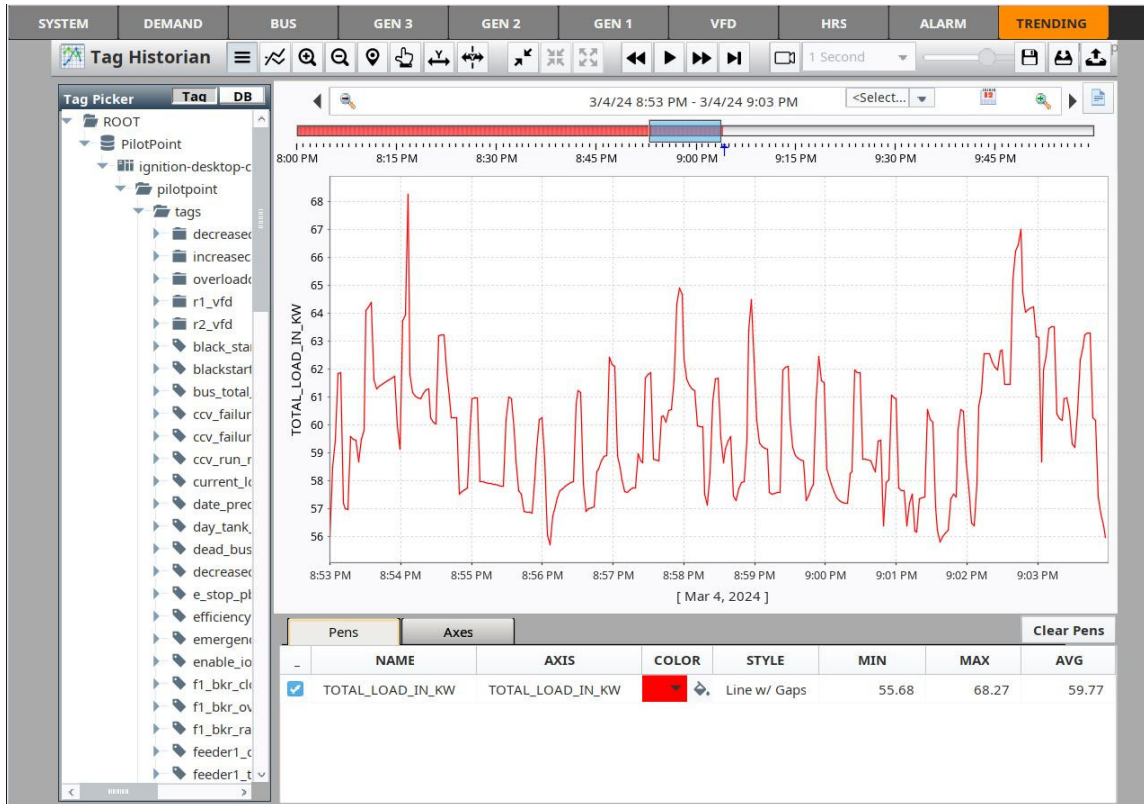
Event Time	Label	Current State	Ack'd By	Priority
12/9/25, 7:30 PM	System Startup	Active, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR SYSTEM MODE SWITCH AUTO COIL	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR GENERAL ALARM ACTIVE COIL	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR ETHERNET I O ALARM COIL	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR ALARM ACTIVE COIL	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	PLC IO FAULT	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	NODE 4 CONN FAULT	Cleared, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR SYSTEM MODE SWITCH AUTO COIL	Active, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR SYSTEM MODE SWITCH AUTO COIL	Cleared, Acknowledged	Live Event Limit	Low
12/9/25, 10:27 AM	MSTR GENERAL ALARM ACTIVE COIL	Active, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR GENERAL ALARM ACTIVE COIL	Cleared, Acknowledged	Live Event Limit	Low
12/9/25, 10:27 AM	MSTR ETHERNET I O ALARM COIL	Active, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR ETHERNET I O ALARM COIL	Cleared, Acknowledged	Live Event Limit	Low
12/9/25, 10:27 AM	MSTR ALARM ACTIVE COIL	Active, Unacknowledged		Low
12/9/25, 10:27 AM	MSTR ALARM ACTIVE COIL	Cleared, Acknowledged	Live Event Limit	Low
12/9/25, 10:27 AM	PLC IO FAULT	Active, Unacknowledged		Low
12/9/25, 10:27 AM	NODE 4 CONN FAULT	Active, Unacknowledged		Low
12/9/25, 10:27 AM	PLC IO FAULT	Cleared, Acknowledged	Live Event Limit	Low
12/9/25, 10:27 AM	NODE 4 CONN FAULT	Cleared, Acknowledged	Live Event Limit	Low
12/7/25, 5:44 PM	GEN 1 GEN NOT IN AUTO COIL	Cleared, Unacknowledged		Low
12/7/25, 5:44 PM	MSTR SYSTEM MODE SWITCH AUTO COIL	Cleared, Unacknowledged		Low
12/7/25, 5:44 PM	GEN 2 GEN NOT IN AUTO COIL	Cleared, Unacknowledged		Low
12/7/25, 5:44 PM	GEN 3 GEN NOT IN AUTO COIL	Cleared, Unacknowledged		Low
12/7/25, 5:44 PM	GEN 1 GEN NOT IN AUTO COIL	Active, Unacknowledged		Low
12/7/25, 5:44 PM	GEN 1 GEN NOT IN AUTO COIL	Cleared, Acknowledged	Live Event Limit	Low
12/7/25, 5:44 PM	MSTR SYSTEM MODE SWITCH AUTO COIL	Active, Unacknowledged		Low
12/7/25, 5:44 PM	MSTR SYSTEM MODE SWITCH AUTO COIL	Cleared, Acknowledged	Live Event Limit	Low
12/7/25, 5:44 PM	GEN 2 GEN NOT IN AUTO COIL	Active, Unacknowledged		Low
12/7/25, 5:44 PM	GEN 2 GEN NOT IN AUTO COIL	Cleared, Acknowledged	Live Event Limit	Low
12/7/25, 5:44 PM	MSTR GENERAL ALARM ACTIVE COIL	Cleared, Unacknowledged		Low
12/7/25, 5:44 PM	MSTR ETHERNET I O ALARM COIL	Cleared, Unacknowledged		Low

192 events

SUMMARY HISTORY

3.4 TRENDING APPLICATION TAGS

The following screens show a representative example of historical trended data and representative tag lists. Trend all PLC and SCADA data. Provide shortcut buttons as shown for ease of access to trended data. Include minimum of four (4) predefined shortcut buttons to trended data (to be determined by AEA and Utility):



```
tagpath
"community"/fuel_panel/blender_control_power_ok
"community"/fuel_panel/blender_filtr_1_plugged
"community"/fuel_panel/blender_filtr_2_plugged
"community"/fuel_panel/blender_oil_hopper_level
"community"/fuel_panel/blender_oil_hopper_lvl_low
"community"/fuel_panel/blender_oil_hopper_temp
"community"/fuel_panel/blender_pump_df2_on
"community"/fuel_panel/blender_pump_p_u02_on
"community"/fuel_panel/dt_control_power_ok
"community"/fuel_panel/dt_fuel_filter_water
"community"/fuel_panel/dt_level
"community"/fuel_panel/dt_pump_p_df1_on
"community"/fuel_panel/dt_pump_timeout
"community"/fuel_panel/dt_tank_farm_vlv_open
"community"/fuel_panel/dt_tank_level_low
"community"/fuel_panel/dt_tank_overfill
"community"/fuel_panel/dt_temp
"community"/fuel_panel/last_blend_cycle_quantity
"community"/fuel_panel/total_used_oil_use
"community"/tags/black_start
"community"/tags/blackstart_feeder1_close
"community"/tags/bus_total_load
"community"/tags/ccv_failure
"community"/tags/ccv_failure_alarm
"community"/tags/ccv_run_relay
"community"/tags/current_load_step
"community"/tags/date_precision_time_string
"community"/tags/day_tank_level_switch
"community"/tags/dead_bus
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_0_
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_1_
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_2_
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_3_
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_4_
"community"/tags/decreasecapacitysetpoints/decreasecapacitysetpoints_5_
"community"/tags/decreasecapacitytimedelay
"community"/tags/e_stop_pb
"community"/tags/efficiency_30_min
"community"/tags/emergency_stop_alarm
"community"/tags/enable_io_simulation
"community"/tags/engine_coolant_temp_sensor
"community"/tags/f1_bkr_closed_status
"community"/tags/f1_bkr_overcurrent
"community"/tags/f1_bkr_racked_out
"community"/tags/feeder_1_open_alarm
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END OF SECTION

**SECTION 26 32 13
ENGINE GENERATORS**

Notes:

- 1) *This specification was prepared for the purchase of the new Owner Furnished Generator #4. Existing Owner Furnished Generators #1, #2, and #3 are similar.*
- 2) *All paragraphs below shown in light italic text reference work that was performed as part of the prior engine-generator purchase contract and are included here for reference only.*
- 3) *All paragraphs below shown in standard text are to be performed under this contract.*
- 4) *49th State Power is the fabricator that is providing the new Owner Furnished Generator #4 under the purchase contract.*
 - a) *Approved submittals for the engine-generator will be made available to the successful bidder upon request.*
 - b) *The Contractor shall hire 49th State Power or an authorized representative to perform initial startup, test run, and final inspection of new Generator #4 as required to ensure full authorization of factory warranty and to file all required paperwork to initiate the manufacturer's warranty.*
- 5) *Additional loose ship items specified herein are being provided with the Owner Furnished Generator #4 at no cost to the Contractor. The Contractor shall install all items on the existing engine generators as noted on the Drawings and specified. The intent is for the final configuration of all 3 existing engine generators to be functionally equivalent to new Generator #4. The scope of modifications are relatively small including sensors and batteries. See paragraph 3.4.*
- 6) *In addition to the installation of the above referenced loose ship items, the engine on Generator #1 needs to be converted from 12VDC starting to 24VDC. The Contractor shall furnish and install all required parts and make all changes for 24VDC conversion. See paragraphs 2.13 and 3.5.*

PART 1 - GENERAL

1.1 SCOPE

- A. *The Work included herein shall consist of providing, fabricating, and shop testing one complete engine generator as specified herein.*
- B. *The engine generator shall be delivered complete and ready for installation.*
- C. *Provide all accessories as specified for the engine generator.*
- D. *Provide additional components as specified for installation on existing engine-generators.*

1.2 RELATED REQUIREMENTS – not used

1.3 SUBMITTALS

- A. *Provide the submittal in a single electronic file in Adobe Acrobat PDF format.*
- 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 mechanical and electrical performance data for the engine and generator.*
- D. *Provide manufacturer's catalog literature for all accessories and equipment.*
- E. *Provide a torsional vibration analysis (TVA) for the proposed engine generator combination within 14-days of contract award.*

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. These regulations were revised effective June 29, 2021. The following provision of 40 CFR applies to this solicitation:

- A. *40 CFR 60.4216(c) stipulates: Manufacturers, owners, and operators of stationary CI ICE that are located in remote areas of Alaska may choose to meet the applicable emission standards for emergency engines in §§ 60.4202 and 60.4205, and not those for non-emergency engines in §§ 60.4201 and 60.4204, except that for 2014 model year and later nonemergency CI ICE, the owner or operator of any such engine must have that engine certified as meeting at least the Tier 3 PM standards identified in appendix I of 40 CFR part 1039 or 40 CFR 1042.101.*

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. *Equipment shall not have been in service at any time prior to delivery, except as required by tests.*
- B. *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.*
- C. *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 generator shall be furnished, assembled, and tested by a qualified fabricator (Fabricator) who is regularly engaged in the business of providing diesel engine driven generator equipment.

- A. *The Fabricator must 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 must include*

installation date, description of installation, and a reference contact for each installation.

- B. The Fabricator must 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 must 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 FABRICATOR WARRANTIES

- A. The Fabricator shall warrant the work for a period of not less than 18 months after delivery to the F.O.B. point.*
- B. In the event of equipment or component failure during the warranty period, the Fabricator shall repair or replace such defective equipment or components and bear all associated costs. Costs shall include material, parts, and labor. The Fabricator will be allowed to charge for travel and per diem expenses within Alaska related to warranty service at actual cost plus 10%. The Fabricator shall assist the Authority as directed to determine the cause of failure and pursue manufacturer's warranties to the extent necessary to obtain replacement equipment and provide proof of action taken upon request.*
- 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.*

1.8 OPERATION AND MAINTENANCE MANUALS.

- A. Provide one (1) complete bound set of operation and maintenance (O&M) manuals for each unique engine generator unit. 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.*
 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.*

PART 2 - PRODUCTS

2.1 GENERAL CONFIGURATION AND MANUFACTURERS

- A. *The unit shall be complete skid mounted engine generators utilizing all new components.*
- B. *The unit 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 for each unit. The engine shall be 1800 RPM unless specifically indicated otherwise. All starting and control systems shall be 24 VDC.*
- D. *Prime Power Rating Nameplate: The Fabricator shall provide a permanently affixed nameplate listing the prime power rating as specified herein for each engine generator.*
- E. *Provide engine of the manufacturer and model as indicated in Paragraph 2.2 - Specific Configuration, no other substitutes except as specifically noted below.*
- F. *Approved equal substitutions of engine will be allowed only by Engineer's approval. To obtain approval, submittals must clearly demonstrate the following:*
1. *The substitute engine must meet all of the requirements of Paragraph 2.3*
 2. *The substitute engine manufacturer must have at least one factory authorized service representative with a permanent shop in Southcentral Alaska.*

3. *The size and weight of the substitute engine must not exceed that of the specified engine by more than 10%.*
 4. *The physical layout, piping connections, and service access areas of the substitute engine must be sufficiently similar to that of the specified engine so that no major changes will be required to the power plant design.*
 5. *The substitute engine must meet or exceed the fuel efficiency rate of the specified engine. Provide fuel curve showing fuel consumption (kWh/gallon) at 25%, 50%, 75% and 100% of prime rated capacity.*
 6. *The substitute engine must be provided with a single jacket water cooling circuit without a separate aftercooler circuit.*
 7. *The substitute engine must meet or exceed the heat rejection to the jacket water circuit of the specified engine.*
 8. *The engine must not be equipped, or require to be equipped, with any exhaust emissions equipment including Exhaust Gas Recirculation, Diesel Oxidation Catalyst, Diesel Particulate Filter, or Selective Catalytic Reduction.*
- G. *Provide Newage/Stamford generator 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.*
- H. *If a Marathon or other generator of equivalent or greater capacity is provided it shall be modified and upgraded prior to installation. Prior to assembling to the engine the following tasks shall be performed:*
1. *Inspect generator internally for defects. If any defects are encountered immediately file a warranty claim with the manufacturer.*
 2. *Electrically test all windings.*
 3. *Check fasteners for proper torque.*
 4. *Replace diode plate mounting bolts with grade 8 bolts with nylok nuts.*
 5. *Insulate main rotor leads with phase paper or fabric wire loom. Secure leads with heat shrinkable polyester tape using epoxy on all knots.*

2.2 SPECIFIC CONFIGURATION

Furnish Engine Generator of the capacity and configuration listed below:

Gen #4: **Engine** - 447 hp, 310 ekW prime, John Deere 6135AFM85, Tier 3 Marine. Configured for generator drive application with 14" diameter flywheel and SAE 1 adapter. Starting and Control Voltage = 24 VDC (convert as required). **Generator** - Minimum 370kW continuous at 105°C rise, Newage/Stamford S4L1D-F41 or Kato equal.

2.3 ENGINE STANDARD FEATURES

- A. *Provide an 1800 RPM diesel engine of newest design and of recent manufacture.*

- B. *The engine shall be a four-cycle, water-cooled, direct injection diesel engine of 6 cylinder in-line configuration as indicated by model number and shall be provided with a gear driven coolant pump where offered by manufacturer.*
- C. *Cylinder Liners: The engine shall be provided with removable cylinder liners to facilitate field rebuilding.*
- D. *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 engine generator prime power application. Special ratings or "continuous standby" ratings will not be acceptable.*
- E. *Fuel: The engine shall be capable of satisfactory performance on No. 1 or No. 2 Ultra Low Sulphur Diesel (ULSD) Fuel.*
- F. *Fuel System: The engine shall have manufacturer's engine mounted fuel filters with replaceable elements.*
- G. *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.*
- H. *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.*

2.4 ENGINE CONTROL AND MONITORING

- A. *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.*
- B. *Engine Monitoring: Provide a J1939 multi-function diagnostic gauge programmed to receive unique John Deere fault codes, John Deere DG14 or approved equal. Note that the diagnostic gauge must be programmed for operation with a Marine Tier 3 engine, no exceptions. Provide with wiring harness as required for connection to ECU and battery power.*
- C. *ECU and Isochronous Governor: Provide an Engine Control Unit (ECU) for interface with the switchgear. Program the ECU as shown in the typical payload file in Attachment A.*
- D. *On all AFM engines with Generation II Marine Electronics provide the following accessories:*
 - 1. *ECU mounting panel with 10' long engine to ECU interconnect harness, DZ110508.*
 - 2. *Generator drive legacy adapter harness ECU to 21 pin connection, DZ107498.*
 - 3. *Min 3' long extension harness with 21 pin connections, John Deere or Murcal.*
 - 4. *Fuel pump relay, 24VDC RE505214. Install on ECU mounting panel.*

5. *Transient voltage protection diode (TVP), 24VDC AT163022. Install on ECU mounting panel.*

2.5 ENGINE MOUNTED ACCESSORIES, WIRING, AND PIPING

- A. *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.*
- B. *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.*
- C. *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.*
- D. *Protective Guards: All moving parts and hot surfaces shall be provided with protective guards in accordance with U.L Standard 2200.*
- E. *Air Cleaners: The engine shall be provided with a metal canister air cleaner with a reusable oiled cotton stock element. John Deere, K&N, Parker, or approved equal. Open disposable type air filters or plastic canisters will not be accepted.*
- F. *Fuel Piping Termination: Fuel supply and return lines shall be routed to the front of generator skid for field connection to the plant piping. See Drawings for detailed configuration.*
- G. *Lube Oil Piping Termination: The oil drain line shall be routed to the front of generator skid for field connection to the plant piping. See Drawings for detailed configuration.*
- H. *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 create a high point 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 Drawings for installation detail.*
- I. *Starting: A starter auxiliary relay shall be furnished and remote mounted in control wiring junction box:*
 1. *24 VDC Relay: John Deere AT145341, Caterpillar 9X-8124, or Denso equal.*
- J. *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.*

- K. *Sensors and Safety Controls: The engine shall be equipped with the following:*
1. *Air Restriction Indicator/Switch, Combination visual indication and alarm switch. 1/8" MPT, 22.46" water column limit, manual reset, normally open switch with adjustable setpoint. Donaldson 135578-08420 or approved equal. Wire into engine harness and program ECU to recognize input. Shop adjust switch to close at 20" water column and verify function.*
 2. *Exhaust Gas Temperature. High temperature, 2 wire, 100 ohm RTD with 36" high temperature lead wire, Deutsch DT06-2S-E008 male connector, Deutsch DT04-2P-E008 female connector, and compression fitting with 1/4" MPT adapter. Watlow 4031-7248 RTD, no substitutes, with Eustis NS34 adapter or equal. See note 2 below for installation.*
- 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 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.*
- L. *Additional Components: In addition to the above specified items provided with the engine-generator provide the following additional items for field installation on existing engines:*
1. *Provide three (3) each air restriction indicator/switches as specified above.*
 2. *Provide three (3) each exhaust gas temperature sensors as specified above.*

2.6 ENGINE MODIFICATIONS

- A. *The crankcase ventilation filter and accessories shall be removed and a single point hose connection shall be left for field connection by others to a crankcase ventilation system.*
- B. *The engine shall be furnished without a charging alternator. Factory installed components shall be removed as required. Idler pulleys shall be added and belt guards shall be modified as required.*
1. *Remove charging alternator.*
 2. *Install transient voltage protection diode, see paragraph 2.4.*
 3. *Install custom fabricated damper guard.*
- C. *The engine shall be furnished without a heat exchanger, coolant expansion tank, or accessory reduction gear drive. Factory installed components shall be removed as required. See Paragraph 2.7, Cooling System.*

2.7 COOLING SYSTEM

- A. *Engine cooling will be by remote radiators (provided by others) with coolant circulation driven by the engine coolant pump.*

- B. *Glycol Filter: Provide screw-on canister style filter element with 3/8" NPT connections on head, Wix #24019 head with #24069 element or approved equal. Mount head on steel bracket fixed to front or side of engine. Connect to engine with glycol hoses with 3/8" NPT quarter turn gauge cock isolation valves. Connect inlet to thermostat housing and connect outlet to water pump inlet. On thermostat housing connection provide 3/8" NPT tee fitting with plug for field connection of pre-heat line by others. When filters are provided as part of engine manufacturer's assembly the standard factory filters may be substituted for the above specified parts; however, equivalent mounting, connections, and isolation valves shall be included.*
- C. *Provide an air vent/pre-heat connection at the high point on the engine coolant system. Provide a threaded ball valve with a 1/2" male hose barb fitting.*
- D. *Modify John Deere 6135AFM engine as follows:*
1. *Furnish with 2-1/2" horizontal facing discharge hose connection and 3" downward facing suction hose connection. Remove coolant expansion tank and other accessories that are not required. Manifold vent lines into a single air vent/pre-heat connection near the front. See photograph for representative configuration.*



2.8 EXHAUST FLEX

- A. *The turbocharger discharge shall be equipped with a 4-hole square "Cat" flange when available.*
- B. *A flexible, continuous, 18 inch long stainless steel exhaust flex connector with welded connections shall be furnished for the engine, Alaska Rubber, DME, Harco, or approved equal. Provide a mating connection to match the turbocharger at one end and a 6" ANSI 125/150# pattern flange at the opposite end. Slotted cuff connections are not acceptable. Provide gasket, bolts, v-clamp, or any other components required for connection to the turbocharger. 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 turbocharger 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.*

2.9 LOOSE SHIP ACCESSORIES

Provide the following accessories for the engine generator (unless otherwise indicated):

- A. *Spring vibration isolators complete with mounting hardware, four (4) per each unit, sized for the complete engine generator unit weight. Caldyn Type 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.*
- D. *The engine generator shall be provided with two each #2/0 AWG arctic flex battery cables, length as required to reach 8 feet beyond the front of the skid. Provide one each #2/0 AWG by 12-inch long jumper. All cables shall include compression type terminal ends shipped loose. 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. Provide plastic terminal covers. The battery cables shall be routed and supported as indicated on the Drawings.*
- E. *Additional Components: In addition to the above specified items provided with each engine provide the following additional accessories for field installation on existing engines:*
 - 1. *Provide 4 each Caldyn RJC 2120 vibration isolators.*
 - 2. *Provide 3 each oil drip pans as specified above.*
 - 3. *Provide 4 each batteries as specified above.*

2.10 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. Windings shall 2/3 pitch, random wound, and lashed at the end turns to provide superior mechanical strength. The generator shall be brushless, 12 lead reconnectable, three phase, 60 Hz, 1800 RPM, and connected for 277/480V service.*
- 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 2 minutes in accordance with NEMA MG1-32.*
- 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*

and rotor shall be coated with resin plus an epoxy sealant for extra moisture and abrasion resistance.

- F. The generator shall be equipped with a permanent magnet generator (PMG) excitation system. 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 1.5 times current.*
- G. Voltage Regulator: The voltage regulator shall be compatible with the PMG excitation and shall control the output of the brushless AC generator by regulating the current into the exciter field. The voltage regulation shall be minimum 0.25% accuracy. Basler DECS-100-A05 or approved equal.*
- 1. The voltage regulator shall be configured for rear mounting and shall be mounted inside of the control wiring junction box as indicated in the Drawings.*
 - 2. The voltage regulator shall be connected to the 3 phase voltage sensing, field, and PMG on terminal blocks in the control wiring junction box as indicated in the Drawings.*
- H. Factory Nameplate: The generator manufacturer shall provide a permanently affixed nameplate that provides the following information:*
- 1. Rated voltage, phase, and power factor.*
 - 2. Insulation class, winding type, and connection.*
 - 3. Rated kW and amperage at specific temperature rise.*
 - 4. Exciter voltage and current.*
- 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 by others 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.*

2.11 MOUNTING SKID

- A. The engine 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 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 Drawings. Wedge washers shall be welded in place on the skid to provide a flat surface for the vibration isolator lock nuts.*
- C. *The engine generator shall be placed on the skid at the location indicated on the Drawings.*

2.12 WIRING JUNCTION BOX FOR INTERFACE WITH REMOTE SWITCHGEAR

- A. *A control wiring junction box shall be furnished with the generator. It will be field installed on a strut rack above the right hand side of the generator enclosure. The engine ECU mounting panel will be installed directly behind the junction box.*
- 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 as indicated on the Drawings for supplying 24 VDC to the switchgear. 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.*
- C. *Furnish the junction box with the following features:*
 - 1. *NEMA 12 steel enclosure with hinged door and screw down latches. B-Line, Hoffman or approved equal. See Drawings for size.*
 - 2. *The junction box orientation, device layout, terminal block layout, and labeling shall be as indicated on the Drawings.*
 - 3. *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.*
 - 4. *Install the voltage regulator and the diagnostic gauge as previously specified in the junction box as shown on the Drawings.*
 - 5. *Install an engine manufacturer's standard 21 pin customer connection for field connection to the engine ECU in the junction box as shown on the Drawings.*
- D. *Additional Components: In addition to the above specified items provided with the engine-generator provide the following for field installation on existing engine-generators:*
 - 1. *Provide 3 each 24VDC engine wiring junction boxes as specified above.*

2.13 GENERATOR #1 6068 STARTING VOLTAGE CONVERSION PARTS

- A. *The existing engine on Generator #1 is John Deere 6068AFM85, Serial# PE6068N021956, with 12VDC starting and control. See Attachment A, Build Code, at the end of this Section for additional detail.*
- B. *Furnish a new starter assembly, fuel pump, and any other components required for voltage conversion. All parts shall be OEM approved, new or factory reman.*

2.14 PAINTING

Each unit shall be painted John Deere marine white including engine, skid, and generator.

2.15 SPARE FILTERS

In addition to the filters installed on the engine, provide the following quantities of replacement filters for the engine plus break in oil. Package spare filters and oil in boxes and label each box with the engine model.

- A. Twelve (12) oil filters.*
- B. Four (4) primary fuel filters.*
- C. Four (4) secondary fuel filters.*
- D. Two (2) air filters plus one air filter service kit.*
- E. Four (4) glycol filters.*
- F. Break in oil identical to oil installed in engine. One (1) gallon for each engine.*

PART 3 - EXECUTION

3.1 SHOP ASSEMBLY

- A. Prior to beginning assembly, thoroughly inspect engine and generator for manufacturing defects or for damage that may have occurred in shipping. Verify that the shipping arms on the front of the generator are intact and that rotor is properly centered. Check inside of generator for dirt or moisture and clean thoroughly.*
- B. Replace the standard factory hardware used for attachment of the generator coupling disc to the engine flywheel with Grade 8 hex head bolts. Install heavy gauge washers, tighten and torque bolts in accordance with manufacturer's specifications, and paint pen mark after final torquing.*
- C. Upon assembly of engine and generator on the skid, ensure proper alignment then adjust and secure supports to ensure alignment is maintained.*
- D. Modify engine as specified previously. Install all accessories, devices, hoses, etc. as specified. Verify that all hose and wiring is properly routed, well supported, and secured to avoid wear points.*
- E. Install exhaust temperature sensor and air restriction indicator/switch and connect wiring junction box. Adjust air restriction switch to close at 20" water column, verify function, and reset.*
- F. ECU Mounting: Configure wiring harness so that ECU panel can be installed approximately 2' above the top of the generator enclosure.*

3.2 SHOP TESTS

- A. Prior to shipment perform shop tests on each unit at the shop where the engine generator is assembled. 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. Provide all required mechanical and electrical equipment including but not limited to fuel supply, radiator, exhaust, load bank, voltage regulator, etc.*
- C. Provide all required measuring and indicating devices. All devices shall be certified correct or correction data furnished for the device.*
- D. Set Up For Load Test: Prior to running the engine perform the following tasks:*
 - 1. Verify that engine is filled with break in oil. The break in oil shall be approved by the engine manufacturer for 100 to 500 hour run time, John Deere Break-In Plus or approved equal. Pull a sample of the clean lube oil prior to the load test to be used for reference.*
 - 2. Perform hydrostatic test on water jackets to ensure that water seals and water jackets are watertight. Test report shall indicate pressure at which test was made and the results.*
 - 3. Connect engine coolant piping to radiator or heat exchanger. Note that all engine coolant circulation must be performed by the engine water pump without the benefit of any external pump or pressurized system.*
 - 4. Install thermometer to monitor coolant return temperature entering the engine for comparison against the coolant discharge temperature.*
 - 5. Connect engine and generator to the associated control wiring junction box.*
- E. Engine Pre-Tests: Prior to the 8 hour load test perform the following tests:*
 - 1. Power up the ECU and program as shown in the typical payload file in Attachment A. Connect the ECU to an analog throttle input and verify that it is correctly responding including idle operation at input less than or equal to 0.5 VDC, 1800 RPM at 2.5 VDC, and variable RPM above and below 2.5 VDC. Note confirmation on the load test. Take screen shots to document the ECU programming and include with the load test reports for each engine.*
 - 2. Run the engine with adequate load to get up to normal operating temperature. Check Service Advisor and verify that the engine is functioning properly and that all parameters are within normal ranges.*
 - 3. Perform a Cylinder Cutout Test in accordance with the manufacturer's procedures. If any cylinders test abnormally, perform a Cylinder Misfire Test and a Cylinder Electronic Compression Test. If any injectors appear to be defective, replace and then repeat tests.*
 - 4. Record the results of the tests, including any corrections made, in the load test report.*
- F. Load Test: Perform a standard commercial shop 8 hour load test on each engine generator including, but not limited to, the following:*
 - 1. 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.*
2. *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, coolant return temperature, lube oil temperature, lube oil pressure, manifold (boost) pressure, and crankcase vacuum.*
 3. *Tests shall indicate satisfactory operation and attainment of guarantees and specified performance.*
- G. *Provide completed test reports to the Authority. Reports shall include but not limited to the following:*
1. *Complete 8-hour load test data.*
 2. *Screen shots of throttle programming and confirmation of response.*
 3. *Photos of split oil filters as described below.*
 4. *Laboratory analysis of the clean lube oil sample and the sample pulled after the test as described below.*

3.3 PREPARATION AND SHIPPING

- A. *Upon completion of testing perform the following steps to prepare for shipping:*
1. *Flush the cooling system with extended life 50/50 ethylene glycol mix, Shell Rotella ELC or approved equal. Install covers over the connections. Note that if testing was performed with extended life ethylene glycol solution the engine does not need to be flushed.*
 2. *Pull a sample of the lube oil. Send to a laboratory for analysis. Include the sample of clean lube oil pulled prior to the load test for reference comparison.*
 3. *Remove oil filter, split case, inspect contents and take photo to document. Note that if excessive or unusual metal fragments are found, contact the Authority immediately. Install new oil filter.*
 4. *Turn the engine at cranking speed with throttle control in full off position and use a sprayer to add a mixture of 50% VCI (volatile corrosion inhibitor) oil and 50% 30-weight engine oil into the engine long enough to ensure the cylinders and exhaust ports are coated.*
 - a. *For marine engines with a jacket water aftercooler, spray the VCI-oil mixture directly into the air intake manifold and then separately spray a small amount into the turbocharger inlet.*
 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 VCI-oil mixture on the flywheel, ring gear teeth, and starter pinion. Install the covers to keep the vapors in.*
 7. *Install a positive mechanical seal consisting of a fitting plate and gasket on exhaust opening. Then install all covers and/or tape on any other openings.*

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 damage 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 and ECU mounting panel to generator.*
 2. *Put a waterproof cover over the entire engine generator unit. Make the cover tight, but loose enough to let air circulate around the unit to prevent damage to exposed metal parts from condensation.*
 3. *All other included components (spare parts, loose items, etc.) shall be packaged individually in waterproof wrapping. Each individual component package shall then be packed in a box or crate, and each box/crate wrapped in waterproof wrapping to prevent corrosion to the components during extended periods of outside storage. All boxes or crates shall be palletized onto the minimum number of pallets, as required for the quantity and size of the boxes/crates.*
 4. *Each component package shall be sequentially numbered and marked for ease of identification. Each box/crate shall also be marked with a unique identifying number. Each pallet shall be provided with a packing slip identifying the number of each box/crate on the pallet, in addition to a listing of each component package within each box/crate. Each pallet shall be marked (with two inch high letters/numbers), on all four sides and the top, with the project or community name.*
 5. *Two copies of the packing slip identifying the quantity of pallets, the crates/boxes on each pallet, and the listing of component packages within each box/crate shall be provided to the Authority.*
- C. *Final payment will not be made until completion of the following:*
1. *The engine-generator and all loose ship parts have been accepted by the Authority at the F.O.B. Point.*
 2. *All required manuals have been accepted by the Authority at the F.O.B. Point.*
 3. *All test reports have been received and approved by the Authority.*

3.4 GENERATOR #1, #2, & #3 OWNER FURNISHED LOOSE SHIP ACCESSORY INSTALLATION

- A. Install new air restriction indicator/switches and exhaust gas temperature sensors on all three engines.
- B. Place new drip pans under on all three engines.
- C. Replace existing batteries on generator #1 and install new batteries on generator #3.

3.5 GENERATOR #1 6068 STARTING VOLTAGE CONVERSION

- A. Remove existing starter assembly, fuel pump, and any other 12VDC components and replace with new 24VDC parts.
- B. Revise ECU programming for 24VDC operation.
- C. Connect to the new Owner Furnished batteries using a series jumper for 24VDC power. Verify proper function of engine.

3.6 INSTALLATION AND COMMISSIONING

- A. Install the new Owner Furnished engine generators #3 and #4 as indicated on the Drawings. Install spring vibration isolators and adjust as indicated on the Drawings.
- B. Ensure correct fit and alignment of all connections to not cause stress on engine connections or wear on piping, hoses, conduit, wiring, etc.
- C. Reinstall accessories such as air filters or oil site gauges that were removed for shipping. Reconnect piping/tubing and securely support.
- D. Reinstall instrumentation such as exhaust temperature sensors or air filter switches that were removed for shipping. Reconnect wiring and properly secure loom.
- E. Install new Owner Furnished instrumentation on existing engine generators #1 and #2 as previously specified. Reconnect wiring and properly secure loom.
- F. Install new Owner Furnished batteries at generators #1, #3, and #4.
- G. Install new Owner Furnished junction boxes at all generators as indicated on the Drawings.
- H. Make final connections of all engine and generator monitoring and control wiring to the junction box. Route in loom or liquid tight flex as indicated and properly secure.
- I. Hire 49th State Power or an authorized representative to perform initial startup, test run, and final inspection of new Gen#4 as required to ensure full authorization of factory warranty and to file all required paperwork to initiate the manufacturer's warranty.
- J. Adjust and mark the oil level site gauge as follows:
 - 1. With engine off verify oil level is full on the dipstick. This is the Static Full Level. Adjust the high level switch to 1/2" above the Static Full Level.
 - 2. Start the engine, place on line, and run under load long enough for level to stabilize. This is the Running Full Level. Mark the Running Full Level with a green paint pen.
 - 3. Adjust the low level switch to 1/2" below the Running Full Level.
- K. Assist the Authority with functional testing and commissioning as required by the Contract Documents.

SEE ATTACHMENT A - GENERATOR #1 PE6068N021956 BUILD CODES

Search Results for PE6068N021956 :

Serial Number	Base Code	Model	Material	Manufactured Date	Parts Catalog No.
PE6068N021956	2892F	6068AFM85	6068AFM85	2022-04-28	PC11936

Rating	EPA Family	EUR Family	Emissions Label Part No.	EPA Certificate	CARB Certificate
6068AFM85E	NJDXN06.8147	N/A*	R573826	NJDXN06.8147-003	

Option Name	Ordered	Factory	Distributor
Rocker Arm Cover, No Oil, with John Deere Logo Medallion	1144	1144	1144
Oil Fill, None	1299	1299	1299
Crankshaft Pulley, 168mm (6.6 in) Pitch Diameter, 8-Ribbed PolyVee Groove	1333	1333	1333
Flywheel Housing, SAE #2, LH 3-Bolt Type 1 Starter Mount with Rear Engine Oil Seal, Bottom Drain Hole	1407	1407	1407
Flywheel for SAE 292.1mm (11.5 in) Over-Center Clutch, 129 Tooth 8/10 Pitch Ring Gear	1597	1597	1597
Fuel Injection Pump, Denso HP3, ECU 12V/24V, Propulsion & Genset	1679	1679	1679
Air Intake, Gen Set	17EC	17EC	17EC
Air Cleaner, Gen Set	1855	1855	1855
Oil Pan, Aluminum, Center Sump 35 Degree Off-Level, 19L	19BP	19BP	19BP
Water Pump	2001	2001	2001
Thermostat Cover, None	2199	2199	2199
Thermostat, None	2299	2299	2299
Fan Drive, None	2399	2399	2399
Fan Belt, Poly Vee 1525mm (60.0 in.) w/ Steel Belt Guard, for use with Small Frame Alternator	24GB	24GB	24GB
Fan, None	2599	2599	2599
Block Heater, None	2699	2699	2699
Expansion Tank for Genset, Keel Cooled	2763	2763	2763
Exhaust Manifold, Genset	28CK	28CK	28CK
Closed Crankcase Ventilation System, Genset	29AG	29AG	29AG
Starter, 24V Letrika 5 Hp, LH 3-Bolt Type 1 Mount, Isolated Ground	3090	3090	3090
Alternator, Small Frame, 24V, 50 Amp, Letrika, Isolated Ground	3149	3149	3149
Fuel Filter, None	3599	3599	3599
Front Plate	3614	3614	3614
Fuel Transfer Pump, None	3799	3799	3799
Operators Manual (English)	3810	3810	3810
Thermostat Housing, None	3999	3999	3999
Dipstick, Integrated Dipstick & Oil Fill, Standard & RH Service	4067	4067	4067
Auxiliary Drive, None	4199	4199	4199
Glow Plug, 24V	4338	4338	4338

Option Name	Ordered	Factory	Distributor
Timing Gear Cover	4443	4443	4443
Cylinder Block w/ Valves, Camshaft	4633	4633	4633
Crankshaft & Bearings	4712	4712	4712
Connecting Rods & Pistons	4852	4852	4852
Valve System, 4 Valve Head, Ductile Iron Camshaft (for use w/Aux Drive)	4940	4940	4940
Oil Pump	5024	5024	5024
Cylinder Head	5120	5120	5120
Gear Driven Auxiliary Drive, Rear Mount, SAE "A", 9-Tooth Spline, for Keel Cooled Only	5202	5202	5202
Fuel Heater, None	5399	5399	5399
Shipping Stand	55AQ	55AQ	55AQ
Paint, Industrial Tan (Paintable)	5601	5601	5601
Water Pump Inlet	5733	5733	5733
Oil Cooler, 9 Plate	5973	5973	5973
Accessory Drive Pulley, None	6099	6099	6099
Alternator Mounting, Small Frame Alternator	6257	6257	6257
Low Pressure Fuel Lines, Standard & LH Service	6392	6392	6392
Exhaust Elbow, 101.6mm (4 in.) Dry with Bolt-On Mounting Flange	6402	6402	6402
Turbocharger, Genset	65D6	65D6	65D6
Temperature Switch, None	6698	6698	6698
Base Engine Sensors	6749	6749	6749
Damper, Single, Heavy Duty Elastomeric (Metaldyne Damper) - Genset	6813	6813	6813
Engine Serial Number Plate and Option Code Label	6901	6901	6901
Power Rating, 24V, 166kW (223 hp) @ 1800 RPM, (150kWe)	72XR	72XR	72XR
Air Conditioning Compressor & Mounting Bracket, None	7499	7499	7499
Oil Pressure Switch, None	7699	7699	7699
Air Compressor Mount, None	7899	7899	7899
Sea Water Pump, None	8099	8099	8099
Fuel Filter, 24V, LH Service	81BQ	81BQ	81BQ
Software, Genset	83VA	83VA	83VA
Wiring Harness and ECU, LH Service, 12V and 24V 6068 T3 Marine Engines	84LY	84LY	84LY
Fan Pulley, None	8699	8699	8699
Belt Tensioner, Automatic for Auxiliary Drive Engines	8701	8701	8701
Oil Filter, Standard & RH Service	8843	8843	8843
Starter Relay, LH 24V	917Y	917Y	917Y
Constant Speed, 166 kW (223 HP) @1800 RPM, IMO MARPOL Annex VI Tier II Compliant, EPA Marine Tier 3	93S9	93S9	93S9
Lift Straps	9801	9801	9801

SECTION 33 73 14
OVERHEAD LIQUID-FILLED TRANSFORMERS

PART 1 - GENERAL

1.1 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 the standards specified herein.
- B. Transformers shall be designed in accordance with RUS requirements and shall be of new construction.
- C. The transformers will be non-evaluated units but shall be provided with minimum efficiencies as specified herein.
- D. Quantities and ratings shall be as indicated on the Drawings.
- E. Transformers shall be suitable for step-down service or step-up service as indicated on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Division 1 Specifications.
- B. Division 26 Specifications.

1.3 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.
- C57.12.31 IEEE Standard for Pole Mounted Equipment–Enclosure Integrity
- C57.12.35: Bar Coding for Distribution Transformers.
- C57.12.37: IEEE Standard for the Electronic Reporting of Distribution Transformer Test Data.
- 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.

- C57.12.154: IEEE Standard for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers using High-Temperature Insulation Systems and Operating at Elevated Temperatures.
- NEMA TR-1: Transformers, Regulators and Reactors, Audible Sound Levels for Liquid-Immersed Power Transformers.
- 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.

1.4 SUBMITTALS

Shop Drawings and Product Data: Provide complete submittals in PDF format in accordance with Section 33 05 00 - Common Work Results for Utilities and Division 1. At a minimum, submit the following:

- A. Prior to beginning transformer fabrication submit the following for approval:
1. Complete transformer electrical data, mechanical and layout drawings, and wiring and connection diagrams for each type of transformer provided.
 2. Drawings shall indicate the kVA rating, transformer impedance, voltage (both primary and secondary), phase of the transformer, winding connection, and tap changers.
 3. Submit nameplate for each size transformer.
- B. Upon completion of transformer fabrication and prior to shipping submit:
1. 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 required by DOE 10 CFR Part 431. Provide sound level of the transformer in dBA.
 2. A statement identifying the amount of PCB in the insulating oil.
- C. Submit manufacturer's data for fused cutouts.

1.5 WARRANTY

The failure of any transformer due to defective design, material and/or workmanship within 12 months after being energized 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. General:

- | | |
|------------------------------|-------------------------------------------------------------------------|
| 1. Primary Voltage Rating: | As indicated on the Drawings. |
| 2. Secondary Voltage Rating: | As indicated on the Drawings. |
| 3. Frequency: | 60 Hz. |
| 4. Phase: | Single or three-phase, as indicated on the Drawings. |
| 5. Impedance: | NEMA Standard. |
| 6. kVA Rating: | As indicated on the Drawings. |
| 7. BIL Rating: | 7.2/12.47 kV: 95 kV.
2400 Volt: 60 kV.
600 Volt and lower: 30 kV. |
| 8. Temperature Rating: | Self-cooled, 65° C above a 30° C ambient. |

2.2 ACCEPTABLE MANUFACTURERS

Acceptable manufactures shall be as follows. Manufacturers shall be on the RUS approved list.

- a. ABB.
- b. Cooper Power.
- c. Ermco.
- d. G. E. Prolec.
- e. Howard Transformers.
- f. Approved equal.

2.3 TRANSFORMER VOLTAGES

- A. Transformer primary and secondary voltages shall be as indicated on the Drawings.
- B. Transformers used as part of a 480/277V three-phase transformer bank shall be rated 277 volts to provide utilization of the full transformer capacity for 480/277 volt, three-phase, 4-wire service.

2.4 EFFICIENCY

The efficiency requirement of DOE 10 CFR part 431.196, for liquid filled transformers, is provided below. Transformers shall meet or exceed the efficiency requirements listed below.

Single-phase	
kVA	Efficiency (%)
10	98.70
15	98.82
25	98.95
37.5	99.05
50	99.11
75	99.19
100	99.25
167	99.33

Note: All efficiency values are at 50 percent of nameplate-rated load, determined according to the DOE Test-Procedure. 10 CFR Part 431, Subpart K, Appendix A.

2.5 TRANSFORMER LOSSES

- A. 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 not exceed the guaranteed bid losses by more than the following:

Tolerance for Transformer Losses

No-Load Losses (%)	Total Losses (%)
10	6

No individual unit shall be shipped that exceeds guaranteed no load losses by more than 10%.

2.6 TRANSFORMER TAPS

Transformers shall be furnished with full capacity high-voltage taps. The taps shall be +/-2 - 2½% above and below rated nominal voltage. The tap changer switch shall be an externally operated switch with a hotstick-operable handle. The tap changer shall be clearly labeled to reflect that the transformer must be de-energized before operating the tap changer as required in IEEE Standard C57.12.20.

2.7 HIGH VOLTAGE BUSHINGS AND TERMINALS

- A. Provide two high voltage bushings. Single bushing transformers will not be acceptable.
- 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" in accordance with IEEE C57.12.20.
- 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 with a minimum rating of 125 kV BIL.

2.8 LOW VOLTAGE (600V) BUSHINGS AND TERMINALS

- A. Low voltage bushings shall be provided with the following ratings.
 - 1. 30 kV BIL Rating.
 - 2. 10 kV 60 Hz Dry 1-Minute Withstand Voltage.
 - 3. 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 on 120/240 volt transformers.
- D. Provide two porcelain bushings on 277 volt transformers used for three-phase service.
- E. 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.

2.9 PROTECTION

- A. No overcurrent protection is required. Transformers shall be protected using external fused cutouts installed by others.

2.10 CORE AND COIL

- A. Windings shall be copper or aluminum. All windings shall meet with the guaranteed temperature rise requirements.
- B. The core shall be manufactured from burr-free, grain-oriented silicon steel and shall be precisely stacked to eliminate gaps in the corner joints. 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.
- C. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum the transformer shall be filled with preheated filtered degassed insulating fluid.

2.11 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.
 - 1. Cracking Pressure: 10-psig \pm 2 psig.
 - 2. Resealing Pressure: 6-psig minimum.
 - 3. Zero leakage from reseal pressure to -8 psig.
 - 4. 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 304 stainless steel. All hardware shall be 304 stainless steel. A bronze nut shall 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.

2.12 PAINTING

- A. The transformer unit shall be painted ANSI 70 light gray. All parts of the transformer shall be painted.
- B. The tank and cabinet coating meet or exceed IEEE Std C57.12.31 standard coating system requirements for pole-mount equipment, including the following performance tests:
 - 1. Salt spray test per ASTM B117 / D1654

2. Cross hatch adhesion test ASTM D3359
3. Humidity test per ASTM D4585 / D3363
4. Impact test per ASTM D2794 / B1117
5. Ultraviolet accelerated weathering (QUV) test per ASTM G154 / D523
6. Abrasion resistance Taber abraser test per ASTM D4060 / B1117

2.13 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.

2.14 TRANSFORMER AUDIBLE SOUND LEVEL

- A. The overhead transformer shall be designed and constructed to minimize the audible noise generated with the transformer energized at rated voltage.
- B. Standard transformer sound level shall not exceed the values given in Table 2 of the latest edition of NEMA Publication TR1.

Transformers shall meet or exceed the sound level requirements listed below.

kVA	Average Sound Level Decibels
0-50	48
51-100	51
101-300	55

2.15 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.

2.16 FUSED CUTOUTS

- A. Primary-fuse cutouts shall be 15 kV, 110 kV BIL, 100A loadbreak open type construction, polymer. 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. Hubbell Power Systems, or approved equal.

PART 3 - EXECUTION

3.1 TESTING AND LOSSES

- A. All units shall be tested for the following:
 - 1. No Load (Core) Losses at 20°C.
 - 2. Load Losses at 85°C and rated current.
 - 3. Total Losses at 85°C.
 - 4. Percent Impedance at 85°C and rated current.
 - 5. Excitation current (100% voltage) test.
 - 6. Efficiency.
 - 7. Ratio tests using all tap settings.
 - 8. Induced potential tests.
 - 9. Full wave and reduced wave impulse test.
- 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. The manufacturer shall provide a statement identifying the amount of PCB in the insulating oil.
- D. One PDF copy of the factory Certified Test Report of each test, in ANSI C57.12.37 format, shall be delivered to the Engineer for review and acceptance prior to shipment of the transformers.

3.2 SHIPPING

- A. The transformers shall be shipped complete, fully assembled, and tested.
- B. The transformers shall be packaged to protect from damage during shipment, handling and storage. The transformers shall be fastened to pallets to allow loading and unloading with a forklift.

3.3 INSTALLATION

- 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. 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.
- C. The existing fused cutouts shall be removed and replaced with new ones sized for the new transformer.

END OF SECTION