

Project Manual For:

**Clarks Point and Port Heiden RPSU Projects
Site Construction
Project No. 19056**



**ALASKA ENERGY
AUTHORITY**

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

Advertising Date: April 30, 2019

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DIVISION 00 – Bidding and Contract Requirements (yellow)

<u>Section No.</u>	<u>Form</u>	<u>Date</u>
<u>Invitation</u> (yellow)		
00 02 00 INVITATION TO BID	25D-7	(8/01)
<u>Bid Notices</u> (yellow)		
00 10 00 INFORMATION TO BIDDERS	25D-3	(7/88)
00 10 10 SUPPLEMENTARY INFORMATION TO BIDDERS		(12/88)
00 12 00 REQUIRED DOCUMENTS	25D-4	(4/12)
<u>Forms</u> (yellow)		
00 12 90 FEDERAL EEO BID CONDITIONS	25A-301	(12/14)
00 14 40 EEO-1 CERTIFICATION	25A-304	(8/01)
00 31 00 PROPOSAL	25D-9A	(07/03)
00 32 00 BID SCHEDULE		
00 41 00 BID BOND	25D-14	(8/01)
00 42 00 BID MODIFICATION	25D-16	(8/01)
00 43 00 SUBCONTRACTOR LIST	25D-5	(10/12)
00 51 00 CONSTRUCTION CONTRACT	25D-10A	(8/01)
00 61 00 PERFORMANCE BOND	25D-13	(8/01)
00 62 00 PAYMENT BOND	25D-12	(8/01)
00 67 00 CONTRACTOR'S QUESTIONNAIRE	25D-8	(8/01)
<u>Contract Provisions and Specifications</u> (white)		
00 70 00 GENERAL CONDITIONS		
00 80 00 SUPPLEMENTARY CONDITIONS		
00 83 00 STATE LABORERS' AND MECHANICS' MINIMUM RATES OF PAY		
	State wage rates can be obtained at http://www.labor.state.ak.us/lss/pamp600.htm . Use the State wage rates that are in effect 10 days before Bid Opening. The AUTHORITY will include a paper copy of the State wage rates in the signed Contract.	
00 83 50 FEDERAL WAGE RATES		
	Federal wage rates can be obtained at http://www.wdol.gov/dba.aspx#0 for the State of Alaska. Use the federal wage rates that are in effect 10 days before bid opening. The AUTHORITY will include a paper copy of the State wage rates in the signed Contract.	
00 90 00 FEDERAL TERMS AND CONDITIONS		

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ALASKA ENERGY AUTHORITY

INVITATION TO BID

for Construction Contract

Date April 30, 2019

**Clarks Point and Port Heiden RPSU Projects
Site Construction
19056**

Location of Project: Clarks Point & Port Heiden, Alaska

Contracting Officer: Lois Lemus

Issuing Office: ALASKA ENERGY AUTHORITY (AUTHORITY)

State Funded []

Federal Aid [x]

Description of Work: This Denali Commission and REF Reappropriate funded contract is for the site work of the power plant modules, as described in 'Section 01 11 13 Summary of Work'.

The Engineer's Estimate is a combine between **\$1,500,000 - \$2,040,000**

All work shall be substantially completed by: **January 14, 2020**

Final Completion **March 3, 2020**

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

Bidders are invited to submit sealed bids, in single copy, for furnishing all labor, equipment, and materials and for performing all work for the project described above. Bids will be opened publicly at 2:00 pm local time, in the Willow conference room, 813 West Northern Lights Blvd., Anchorage, Alaska on May 21, 2019.

SUBMISSION OF BIDS

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

Bid for Project:
Clarks Point and Port Heiden RPSU Projects
Site Construction
Project Number: 19056

ATTN: Lois Lemus Contracting Officer
Alaska Energy Authority
813 West Northern Lights Blvd.
Anchorage, AK 99503

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

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

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

NOTICE TO BIDDERS

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

See attached Special Notice to Bidders for this project.

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

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

Phone: (907) 771-3909

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:

Alan Fetters, Project Manager Phone: (907) 771- 3063

Fax: (907) 771-3044

All questions relating to design features, constructability, quantities, or other technical aspects of the project and questions concerning bidding procedures should be directed to:

Lois Lemus
Contracting Officer
813 West Northern Lights Blvd.
Anchorage, AK 99503

Phone: (907) 771-3909 Email: llemus@aidea.org

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

Reminder: 3 AAC 109.220 requires all Bidders to have a valid Alaska Business License and an Alaska Contractor's Certificate of Registration prior to award.

Special Notice to Bidders

1. A non-mandatory pre-bid meeting is scheduled for **May 9, 2019, 2:00pm** in the Aspen Conference room at the AIDEA/AEA Building **813 West Northern Lights Blvd, Anchorage, AK 99503**. This is not a mandatory meeting, and there will not be a scheduled site visit prior to the bid opening.

ALASKA ENERGY AUTHORITY
INFORMATION TO BIDDERS

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

EXAMINATION OF CONTRACT REQUIREMENTS

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

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

CONDITIONS AT SITE OF WORK

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

PREPARATION OF BIDS

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

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

- (c) The bidder shall specify the price or prices bid in figures. On unit price contracts the bidder shall also show the products of the respective unit prices and quantities written in figures in the column provided for the purpose and the total amount of the proposal obtained by adding the amounts of the several items. All the figures shall be in ink or typed.
- (d) Neither conditional nor alternative bids will be considered unless called for.
- (e) Unless specifically called for, telegraphic or telefacsimile bids will not be considered.
- (f) Bid Schedule form should be enclosed in a separate sealed envelope and enclosed with all other bidding forms required at the opening.

BID SECURITY

All bids shall be accompanied by a bid security in the form of an acceptable Bid Bond (Form 25D-14), or a certified check, cashier's check or money order made payable to the Alaska Energy Authority. The amount of the bid security is specified on the Invitation To Bid.

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

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

The Authority will hold the bid securities of the two lowest bidders until the Contract has been executed, after which they will be returned. All other bid securities will be returned as soon as practicable.

BIDDERS QUALIFICATIONS

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

SUBMISSION OF BIDS

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

ADDENDA REQUIREMENTS

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

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

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

WITHDRAWAL OR REVISION OF BIDS

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

Emailed or telefacsimile modifications shall include both the modification of the unit bid price and the total modification of each item modified, but shall not reveal the amount of the total original or revised bids. Form 25D-16 shall be used to submit such modifications.

RECEIPT AND OPENING OF BIDS

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

BIDDERS PRESENT

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

BIDDERS INTERESTED IN MORE THAN ONE BID

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

REJECTION OF BIDS

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

AWARD OF CONTRACT

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

ALASKA ENERGY AUTHORITY

SUPPLEMENTARY INFORMATION TO BIDDERS

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

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

"CONSIDERATION OF PROPOSALS

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

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

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

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

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

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

A Bidder may replace a listed Subcontractor who:

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

Modify subject area "AWARD OF CONTRACT" as follows:

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

Subparagraph (b) delete and substitute the following:

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

REQUIRED DOCUMENTS

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

1. **Bid Form (Form 25D-9)**
2. **Bid Schedule**
3. **Bid Security**
4. Any bid revisions must be submitted by the bidder prior to bid opening on the following form:
Bid Modification (Form 25D-16)

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

1. **Subcontractor List (Form 25D-5)**

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

1. **Construction Contract (Form 25D-10A)**
2. **Payment Bond (Form 25D-12)**
3. **Performance Bond (Form 25D-13)**
4. **Contractor's Questionnaire (Form 25D-8)**
5. **EEO-1 Certification (25A-304)**
6. **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.

STATE OF ALASKA
ALASKA ENERGY AUTHORITY

EEO-1 CERTIFICATION

Federal-Aid Contracts

Clarks Point and Port Heiden RPSU Projects

Site Construction

19056

This certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor [41 CFR 60-1.7 (b) (1)] and must be completed by the successful Bidder and each proposed Subcontractor participating in this contract.

PLEASE CHECK APPROPRIATE BOXES

The Bidder Proposed Subcontractor hereby CERTIFIES:

PART A. Bidders and proposed Subcontractors with 50 or more year-round employees and a federal contract amounting to \$50,000 or more are required to submit one federal Standard Report Form 100 during each year that the two conditions exist (50 employees and a \$50,000 federal contract).

The company named below (Part C) is exempt from the requirements of submitting the Standard Report Form 100 this year.

NO (go to PART B)

YES (go to PART C)

Instructions and blank Standard Report Form 100's may be obtained from a local U.S. Department of Labor office, or by writing to:

The Joint Reporting Committee
P.O. Box 779
Norfolk, Virginia 23501

Telephone number: (757) 461-1213

PART B. The company named below has submitted the Standard Report Form 100 this year.

NO

YES

Note: Bidders and proposed Subcontractors who have not filed the required Standard Report Form 100 and are not exempt from filing requirements will not be awarded this contract or subcontract until Form 100 has been filed for the current year ending June 30.

PART C.

Signature of Authorized Company Representative

Title

Company Name

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

()

Date

Phone Number

ALASKA ENERGY AUTHORITY

PROPOSAL
of

NAME _____

ADDRESS _____

To the CONTRACTING OFFICER, ALASKA ENERGY AUTHORITY:

In compliance with your Invitation To Bid dated **May 21, 2019**, 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

Clarks Point and Port Heiden RPSU Projects

Site Construction

Project No. 19056

Located at **Anchorage, Alaska**, according to the plans and specifications and for the amount and prices named herein as indicated on the Bid Schedule consisting of **1** sheet(s), which is made a part of this Bid.

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

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

The Undersigned agrees to commence the work within 10 calendar days after the effective date of Notice to Proceed and to substantially complete the work by **January 14, 2020**, unless extended in writing by the Contracting Officer. Final inspection and completion shall be on or before **March 3, 2020** 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

**Clarks Point and Port Heiden RPSU Projects
Site Construction
Project No. 19056**

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

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

Contract award shall be made based on the Total Bid plus additive alternate. If Bid Alternates are included in the Bid Documents, AEA reserves the right to award none or all of the alternate.

Conditioned or qualified bids will be considered non-responsive.

Item	Description	Quantity	Unit	Unit Price	Extended Total Amount
BASE BID:					
A1	Clarks Point Rural Power Plant System Upgrade	1	LS	\$	\$
A3	Port Heiden Power Plant System Upgrade	1	LS	\$	\$
TOTAL BID					\$
Additive Alternate:					
Bid Item	Description	Lump Sum Price			
A2	Clarks Point Rural Power System Upgrade Additive Alternate #1	\$			
Total Bid: Sum of Base Bid and Additive Alternates				\$	
<p>Bidder is required to bid on all bid items, including all Additive Alternates.</p> <p>See Specification Section 01 11 13 Summary of Work for detailed descriptions of each bid item.</p>					

Contractor's Name (Printed)

Alaska Contractor's Registration #

Expires

Alaska Business License #

Expires

Email

ALASKA ENERGY AUTHORITY

BID BOND

For
Clarks Point and Port Heiden RPSU Projects
Site Construction
19056

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.

ALASKA ENERGY AUTHORITY

CONSTRUCTION CONTRACT
Clarks Point and Port Heiden RPSU Projects
Site Construction
19056

This CONTRACT, between the ALASKA ENERGY AUTHORITY, herein called the Authority, acting by and through its Contracting Officer, and

Company Name

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

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

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

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

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

The Contractor further covenants and agrees that all materials shall be furnished and delivered and all labor shall be done and performed, in every respect, to the satisfaction of the Authority, on or before: _____ or within _____ calendar days. It is expressly understood and agreed that in case of the failure on the part of the Contractor, for any reason, except with the written consent of the Authority, to complete the furnishing and delivery of materials and the doing and performance of the work before the aforesaid date, the Authority shall have the right to deduct from any money due or which may become due the Contractor, or if no money shall be due, the Authority shall have the right to recover _____ Dollars (\$ _____) per day for each calendar day elapsing between the time stipulated for the completion and the actual date of completion in accordance with the terms hereof; such deduction to be made, or sum to be recovered, not as a penalty but as liquidated damages.

The bonds given by the Contractor in the sum of \$ _____ Payment Bond, and \$ _____ Performance Bond, to secure the proper compliance with the terms and provisions of this Contract, are submitted herewith and made a part hereof.

IN WITNESS WHEREOF, the parties hereto have executed this Contract and hereby agree to its terms and conditions.

CONTRACTOR

Company Name

Signature of Authorized Company Representative

Typed Name and Title

Date

(Corporate Seal)

ALASKA ENERGY AUTHORITY

Signature of Contracting Officer

Typed Name

Date

ALASKA ENERGY AUTHORITY

PERFORMANCE BOND

Bond No. _____

For
Clarks Point and Port Heiden RPSU Projects
Site Construction
19056

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
Clarks Point and Port Heiden RPSU Projects
Site Construction
19056

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
- 3.6 Clarifications and Interpretations
- 3.7 Reuse of Documents
- ARTICLE 4 LANDS AND PHYSICAL CONDITIONS
- 4.1 Availability of Lands
- 4.2 Visit to Site
- 4.3 Explorations and Reports
- 4.4 Utilities
- 4.5 Damaged Utilities
- 4.6 Utilities Not Shown or Indicated
- 4.7 Survey Control
- ARTICLE 5 BONDS AND INSURANCE, AND INDEMNIFICATION
- 5.1 Delivery of Bonds
- 5.2 Bonds
- 5.3 Replacement of Bond and Surety
- 5.4 Insurance Requirements
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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
- 6.6 Anticipated Schedules
- 6.7 Finalizing Schedules
- 6.8 Adjusting Schedules
- 6.9 Substitutes or "Or-Equal" Items
- 6.10 Substitute Means and Methods
- 6.11 Evaluation of Substitution
- 6.12 Dividing the Work
- 6.13 Subcontractors

- 6.14 Use of Premises
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- 6.16 Record Documents
- 6.17 Safety and Protection
- 6.18 Safety Representative
- 6.19 Emergencies
- 6.20 Shop Drawings and Samples
- 6.21 Shop Drawing and Sample Review
- 6.22 Maintenance during Construction
- 6.23 Continuing the Work
- 6.24 Consent to Assignment
- 6.25 Use of Explosives
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ARTICLE 7 LAWS AND REGULATIONS

- 7.1 Laws to be observed
- 7.2 Permits, Licenses, and Taxes
- 7.3 Patented Devices, Materials and Processes
- 7.4 Compliance of Specifications and Drawings
- 7.5 Accident Prevention
- 7.6 Sanitary Provisions
- 7.7 Business Registration
- 7.8 Professional Registration and Certification
- 7.9 Local Building Codes
- 7.10 Air Quality Control
- 7.11 Archaeological or Paleontological Discoveries
- 7.12 Applicable Alaska Preferences
- 7.13 Preferential Employment
- 7.14 Wages and Hours of Labor
- 7.15 Overtime Work Hours and Compensation
- 7.16 Covenants against Contingent Fees
- 7.17 Officials Not to Benefit
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ARTICLE 8 OTHER WORK

- 8.1 Related Work at Site
- 8.2 Access, Cutting, and Patching
- 8.3 Defective Work by Others
- 8.4 Coordination

ARTICLE 9 CHANGES

- 9.1 AUTHORITY's Right to Change
- 9.2 Authorization of Changes within the General Scope
- 9.3 Directive
- 9.4 Change Order
- 9.5 Shop Drawing Variations
- 9.6 Changes outside the General Scope; Supplemental Agreement
- 9.7 Unauthorized Work
- 9.8 Notification of Surety
- 9.9 Differing Site Conditions

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ARTICLE 10 CONTRACT PRICE; COMPUTATION AND CHANGE

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

ARTICLE 11 CONTRACT TIME, COMPUTATION AND CHANGE

- 11.1 Commencement of Contract Time; Notice to Proceed
- 11.2 Starting the Work
- 11.3 Computation of Contract Time
- 11.4 Time Change
- 11.5 Extension Due to Delays
- 11.6 Essence of Contract
- 11.7 Reasonable Completion Time
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ARTICLE 12 QUALITY ASSURANCE

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

ARTICLE 13 PAYMENTS TO CONTRACTOR AND COMPLETION

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

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

ARTICLE 14 SUSPENSION OF WORK AND TERMINATION

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

ARTICLE 15 CLAIMS AND DISPUTES

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

ARTICLE 1 - DEFINITIONS

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

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

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

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

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

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

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

A.S - Initials which stand for Alaska Statute.

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

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

Bid Bond - A type of Proposal Guaranty.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

General Requirements - Sections of Division 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 DEPARTMENT shall have the right to annul this Contract without liability or, in its discretion, to deduct price of consideration from the Contract or otherwise

recover the full amount of such commission, percentage, brokerage, or contingent fee.

7.17 Officials Not to Benefit:

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

7.18 Personal Liability of Public Officials:

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

ARTICLE 8 - OTHER WORK

8.1 Related Work at Site:

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

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

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

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

8.2 Access, Cutting, and Patching:

The CONTRACTOR shall afford each utility owner and any other contractor who is a party to such a direct contract with the AUTHORITY (or the AUTHORITY, if the AUTHORITY is performing the additional work with the AUTHORITY's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with the work of others. The CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work, the CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering

their work and will only cut or alter such other work with the written consent of the Project Manager. The duties and responsibilities of the CONTRACTOR under this paragraph are for the benefit of other contractors to the extent that there are comparable provisions for the benefit of the CONTRACTOR in said direct contracts between the AUTHORITY and other contractors.

8.3 Defective Work by Others:

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

8.4 Coordination:

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

ARTICLE 9 - CHANGES

9.1 AUTHORITY's Right to Change

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

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

9.2 Authorization of Changes within the General Scope.

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

- 9.2.1 Directive (pursuant to paragraph 9.3)
- 9.2.2 A Change Order (pursuant to paragraph 9.4)
- 9.2.3 AUTHORITY's acceptance of Shop Drawing variations from the Contract Documents as specifically identified by the CONTRACTOR as required by paragraph 6.20.4.

9.3 Directive

- 9.3.1 The Contracting Officer shall provide written clarification or interpretation of the Contract Documents (pursuant to paragraph 3.6).
- 9.3.2 The Project Manager may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents.
- 9.3.3 The Project Manager may order the Contractor to correct Defective Work or methods which are not in conformance with the Contract Documents.
- 9.3.4 The Project Manager may direct the commencement or suspension of Work or emergency related Work (as provided in paragraph 6.19).
- 9.3.5 Upon the issuance of a Directive to the CONTRACTOR by the Project Manager, the CONTRACTOR shall proceed with the performance of the Work as prescribed by such Directive.
- 9.3.6 If the CONTRACTOR believes that the changes noted in a Directive may cause an increase in the Contract Price or an extension of Contract Time, the CONTRACTOR shall immediately provide written notice to the Project Manager depicting such increases before proceeding with the Directive, except in the case of an emergency. If the Project Manager finds the increase in Contract Price or the extension of Contract Time justified, a Change Order will be issued. If however, the Project Manager does not find that a Change Order is justified, the Project Manager may direct the CONTRACTOR to proceed with the Work. The CONTRACTOR shall cooperate with the Project Manager in keeping complete daily records of the cost of such Work. If a Change Order is ultimately determined to be justified, in the absence of agreed prices and unit prices, payment for such Work will be made on a "cost of the work basis" as provided in 10.4

9.4 Change Order

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

9.5 Shop Drawing Variations

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

9.6 Changes Outside the General Scope; Supplemental Agreement

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

9.7 Unauthorized Work:

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

9.8 Notification of Surety:

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

9.9 Differing Site Conditions:

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

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

9.10 Interim Work Authorization

An Interim Work Authorization may be used to establish a change within the scope of the Work; however, only a Change Order shall establish associated changes in Contract Time and Price. Work authorized by Interim Work Authorization shall be converted to a Change Order. The basis of payment shall be as stated in the Interim Work Authorization, unless it states that the basis of payment has not been established and is to be negotiated, in which case the Cost of the Work shall be documented pursuant to Article 10.4, to establish a basis for negotiating a lump sum price for the Change Order.

ARTICLE 10 - CONTRACT PRICE; COMPUTATION AND CHANGE

10.1 Contract Price:

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

10.2 Claim for Price Change:

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

10.3 Change Order Price Determination:

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

10.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of subparagraphs 10.9.1 through 10.9.3, inclusive).

10.3.2 By mutual acceptance of a lump sum price that includes overhead and profit. The following maximum rates of cost markup (to cover both overhead and profit of the CONTRACTOR) shall be used in the negotiation of a Lump Sum Change Order:

- a. 17% - where a cost is borne directly by prime contractor (first tier contractor).
- b. 10% - where a cost is borne by a subcontractor (lower tier contractor).

Where the cost is borne by a subcontractor acting as a first tier contractor, the allowable overhead and profit markup for lump sum change orders shall not exceed 17%. Any lower tier subcontractors, including the CONTRACTOR in this case, for whom the first tier subcontractor performs the work, shall be allowed an overhead and profit markup that does not exceed 10%.

10.3.3 When 10.3.1 and 10.3.2 are inapplicable, on the basis of the "cost of the work" (determined as provided in paragraphs 10.4 and 10.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 10.6).

10.3.4 Before a Change Order or Supplemental Agreement is approved, the CONTRACTOR shall submit cost or pricing data regarding the changed or extra Work. The CONTRACTOR shall certify that the data submitted is, to his best knowledge and belief, accurate, complete and current as of a mutually determined specified date and that such data will continue to be accurate and complete during the performance of the changed or extra Work.

10.4 Cost of the Work:

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

- 10.4.1 Payroll costs for employees in the direct employ of the CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by the AUTHORITY and the CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include manual workers up through the level of foreman but shall not include general foremen, superintendents, and non-manual employees. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays shall be included in the above to the extent authorized by the AUTHORITY.
- 10.4.2 Cost of all materials and equipment furnished and incorporated or consumed in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to the CONTRACTOR unless the AUTHORITY deposits funds with the CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to the AUTHORITY. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the AUTHORITY, and the CONTRACTOR shall make provisions so that they may be obtained.
- 10.4.3 Payments made by the CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by the AUTHORITY, CONTRACTOR shall obtain competitive quotes from Subcontractors or Suppliers acceptable to the CONTRACTOR and shall deliver such quotes to the AUTHORITY who will then determine which quotes will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of "cost of the work" plus a fee, the Subcontractor' "cost of the work" shall be determined in the same manner as the CONTRACTOR's "cost of work" as described in paragraphs 10.4 through 10.5; and the Subcontractor's fee shall be established as provided for under subparagraph 10.6.2 clause b. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.
- 10.4.4 Costs of special consultants (including but not limited to engineers, architects, testing laboratories, and surveyors) employed for services necessary for the completion of the Work.
- 10.4.5 Supplemental costs including the following:
- a. The proportion of necessary transportation, travel and subsistence expenses of the CONTRACTOR's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of the CONTRACTOR.
 - c. Rentals of all construction equipment and machinery and the parts thereof whether rented from the CONTRACTOR or others in accordance with rental agreements Approved by the AUTHORITY and the costs of transportation, loading, unloading, installation, dismantling and removal thereof - all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

For any machinery or special equipment (other than small tools) which has been authorized by

the Project Manager, the CONTRACTOR shall receive the rental rates in the current edition and appropriate volume of the "Rental Rate Blue Book for Construction Equipment", published by Dataquest, Inc., 1290 Ridder Park Drive, San Jose, CA 95131. Hourly rental rates shall be determined as follows:

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

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

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

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

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

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

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

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

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

The hourly stand-by rate shall be equal to the adjusted monthly rate for the basic equipment plus the adjusted monthly rate for applicable attachments, both divided by 352, all multiplied by the area adjustment factor.

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

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

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

10.5 Excluded Costs:

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

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

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

10.6 CONTRACTOR's Fee:

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

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

10.7 Cost Breakdown:

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

10.8 Cash Allowances:

It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors

or Suppliers and for such sums within the limit of the allowances as may be acceptable to the Contracting Officer. CONTRACTOR agrees that:

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

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

10.9 Unit Price Work:

- 10.9.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by the CONTRACTOR will be made by the AUTHORITY in accordance with paragraph 10.10.
- 10.9.2 Each unit price will be deemed to include an amount considered by the CONTRACTOR to be adequate to cover the CONTRACTOR's overhead and profit for each separately identified item. If the "Basis of Payment" clause in the Contract Documents relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Contract Documents.
- 10.9.3 Payment to the CONTRACTOR shall be made only for the actual quantities of Work performed and accepted or materials furnished, in conformance with the Contract Documents. When the accepted quantities of Work or materials vary from the quantities stated in the bid schedule, or change documents, the CONTRACTOR shall accept as payment in full, payment at the stated unit prices for the accepted quantities of Work and materials furnished, completed and accepted; except as provided below:
 - a. When the quantity of Work to be done or material to be furnished under any item, for which the total cost of the item exceeds 10% of the total Contract Price, is increased by more than 25 percent of the quantity stated in the bid schedule, or change documents, either party to the Contract, upon demand, shall be entitled to an equitable unit price adjustment on that portion of the Work above 125 percent of the quantity stated in the bid schedule.
 - b. When the quantity of Work to be done or material to be furnished under any major item, for which the total cost of the item exceeds 10% of the total Contract Price, is decreased by more than 25 percent of the quantity stated in the bid schedule, or change documents either party to the Contract, upon demand, shall be entitled to an equitable price adjustment for the quantity

of Work performed or material furnished, limited to a total payment of not more than 75 percent of the amount originally bid for the item.

10.10 Determinations for Unit Prices:

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

ARTICLE 11 - CONTRACT TIME; COMPUTATION AND CHANGE

11.1 Commencement of Contract Time; Notice to Proceed:

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

11.2 Starting the Work:

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

11.3 Computation of Contract Time:

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

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

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

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

11.4 Time Change:

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

11.5 Extension Due to Delays:

The right of the CONTRACTOR to proceed shall not be terminated nor the CONTRACTOR charged with liquidated or actual damages because of delays to the completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of the

CONTRACTOR, including, but not restricted to the following: acts of God or of the public enemy, acts of the AUTHORITY in its contractual capacity, acts of another contractor in the performance of a contract with the AUTHORITY, floods, fires, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather and delays of Subcontractors or Suppliers due to such causes. Any delay in receipt of materials on the site, caused by other than one of the specifically mentioned occurrences above, does not of itself justify a time extension, provided that the CONTRACTOR shall within twenty four (24) hours from the beginning of any such delay (unless the Contracting Officer shall grant a further period of the time prior to the date of final settlement of the Contract), notify the Project Manager in writing of the cause of delay. The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the Work when the findings of fact justify such an extension.

11.6 Essence of Contract:

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

11.7 Reasonable Completion Time:

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

11.8 Delay Damages:

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

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

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

For each calendar day that the work remains incomplete after the expiration of the Contract Time, liquidated damages in the amount as stated in 00800, Supplemental Conditions shall be assessed to the CONTRACTOR. If no money is due the CONTRACTOR, the AUTHORITY shall have the right to recover said sum from the CONTRACTOR, the surety or both. The amount of these deductions is to reimburse the AUTHORITY for estimated liquidated damages incurred as a result of the CONTRACTOR's failure to complete the work within the time specified. As liquidated

damages, such deductions are not to be considered as penalties.

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

ARTICLE 12 - QUALITY ASSURANCE

12.1 Warranty and Guaranty:

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

12.2 Access to Work:

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

12.3 Tests and Inspections:

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

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

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

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

12.4 Uncovering Work:

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

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

12.5 AUTHORITY May Stop the Work:

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

12.6 Correction or Removal of Defective Work:

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

12.7 One Year Correction Period:

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

AUTHORITY before Substantial Completion of all the Work, the correction period for that item may begin on an earlier date if so provided in the Specifications or by Change Order. Provisions of this paragraph are not intended to shorten the statute of limitations for bringing an action.

12.8 Acceptance of Defective Work:

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

12.9 AUTHORITY May Correct Defective Work:

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

ARTICLE 13 - PAYMENTS TO CONTRACTOR AND COMPLETION

13.1 Schedule of Values:

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

13.2 Preliminary Payments:

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

13.3 Application for Progress Payment:

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

13.4 Review of Applications for Progress Payment:

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

13.5 Stored Materials and Equipment:

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

13.6 CONTRACTOR's Warranty of Title:

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

13.7 Withholding of Payments:

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

13.7.1 The Work is Defective, or completed Work has been damaged requiring correction or replacement, or has been installed without Approval of Shop Drawings, or by an unapproved Subcontractor, or for unsuitable storage of materials and equipment.

13.7.2 The Contract Price has been reduced by Change Order,

- 13.7.3 The AUTHORITY has been required to correct Defective Work or complete Work in accordance with paragraph 12.9.
- 13.7.4 The AUTHORITY's actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.2.1.a through 14.2.1.k inclusive.
- 13.7.5 Claims have been made against the AUTHORITY or against the funds held by the AUTHORITY on account of the CONTRACTOR's actions or inactions in performing this Contract, or there are other items entitling the AUTHORITY to a set off.
- 13.7.6 Subsequently discovered evidence or the results of subsequent inspections or test, nullify any previous payments for reasons stated in subparagraphs 13.7.1 through 13.7.5.
- 13.7.7 The CONTRACTOR has failed to fulfill or is in violation of any of his obligations under any provision of this Contract.

13.8 Retainage:

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

13.9 Request for Release of Funds:

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

13.10 Substantial Completion:

When the CONTRACTOR considers the Work ready for its intended use the CONTRACTOR shall notify the Project Manager in writing that the Work or a portion of Work which has been specifically identified in the Contract Documents is substantially complete (except for items specifically listed by the CONTRACTOR as incomplete) and request that the AUTHORITY issue a certificate of Substantial Completion. Within a reasonable time thereafter, the Project Manager, the CONTRACTOR and Engineer(s) shall make an inspection of the Work to determine the status of completion. If the Project Manager does not consider the Work substantially complete, the Project Manager will notify the CONTRACTOR in writing giving the reasons therefore. If the Project Manager considers the Work substantially complete, the Project Manager will within fourteen days execute and deliver to the CONTRACTOR a certificate of Substantial Completion with tentative list of items to be completed or corrected. At the time of delivery of the certificate of Substantial Completion the Project Manager will deliver to the CONTRACTOR a written division of responsibilities pending Final Completion with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties which shall be consistent with the terms of the Contract Documents.

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

13.11 Access Following Substantial Completion:

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

13.12 Final Inspection:

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

13.13 Final Completion and Application for Payment:

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

13.14 Final Payment:

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

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

13.15 Final Acceptance:

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

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

13.16 CONTRACTOR's Continuing Obligation:

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

13.17 Waiver of Claims by CONTRACTOR:

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

13.18 No Waiver of Legal Rights:

The AUTHORITY shall not be precluded or be estopped by any payment, measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefore, from showing the true amount and character of the Work performed and materials furnished by the CONTRACTOR, nor from showing that any payment, measurement, estimate or certificate is untrue or is incorrectly made, or that the Work or materials are Defective. The AUTHORITY shall not be precluded or estopped, notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the CONTRACTOR or his Sureties, or both, such damages as it may sustain by reason of his failure to comply with requirements of the Contract Documents. Neither the acceptance by the AUTHORITY, or any representative of the AUTHORITY, nor any payment for or acceptance of the whole or any part of the Work, nor any extension of the Contract Time, nor any possession taken by the AUTHORITY, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or of any right to damages. A waiver by the AUTHORITY of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

ARTICLE 14 - SUSPENSION OF WORK, DEFAULT AND TERMINATION

14.1 AUTHORITY May Suspend Work:

14.1.1 The AUTHORITY may, at any time, suspend the Work or any portion thereof by notice in writing to the CONTRACTOR. If the Work is suspended without cause the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both,

directly attributable to any suspension if the CONTRACTOR makes an Approved claim therefore as provided in Article 15. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that suspension is due to the fault or negligence of the CONTRACTOR, or that suspension is necessary for Contract compliance, or that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the CONTRACTOR.

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

14.2 Default of Contract:

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

- a. fails to begin work in the time specified,
- b. fails to use sufficient resources to assure prompt completion of the work,
- c. performs the work unsuitably or neglect or refuse to remove and replace rejected materials or work,
- d. stops work,
- e. fails to resume stopped work after receiving notice to do so,
- f. becomes insolvent (except that if you declare bankruptcy, termination will be under Title 11 US Code 362 and/or 365. Your bankruptcy does not relieve the surety of any obligations to assume the Contract and complete the work in a timely manner.
- g. Allows any final judgment to stand against him unsatisfied for period of 60 days, or
- h. Makes an assignment for the benefit of creditors without the consent of the Contracting Officer, or
- i. Disregards Regulatory Requirements of any public body having jurisdiction, or
- j. Otherwise violates in any substantial way any provisions of the Contract Documents, or
- k. fails to comply with Contract minimum wage payments or civil rights requirements, or
- l. are party to fraud, deception, misrepresentation , or
- m. for any cause whatsoever, fails to carry on the Work in an acceptable manner.

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

- 14.2.3 If the CONTRACTOR or Surety, within the time specified in the above notice of default, shall not proceed in accordance therewith, then the AUTHORITY may, upon written notification from the Contracting Officer of the fact of such delay, neglect or default and the CONTRACTOR's failure to comply with such notice, have full power and authority without violating the Contract, to take the prosecution of the Work out of the hands of the CONTRACTOR. The AUTHORITY may terminate the services of the CONTRACTOR, exclude the CONTRACTOR from the site and take possession of the Work and of all the CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by the CONTRACTOR (without liability to the CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which the AUTHORITY has paid the CONTRACTOR but which are stored elsewhere, and finish the Work as the AUTHORITY may deem expedient. The AUTHORITY may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, or use such other methods that in the opinion of the Contracting Officer are required for the completion of said Contract in an acceptable manner.
- 14.2.4 The Contracting Officer may, by written notice to the CONTRACTOR and his Surety or his representative, transfer the employment of the Work from the CONTRACTOR to the Surety, or if the CONTRACTOR abandons the Work undertaken under the Contract, the Contracting Officer may, at his option with written notice to the Surety and without any written notice to the CONTRACTOR, transfer the employment for said Work directly to the Surety. The Surety shall submit its plan for completion of the Work, including any contracts or agreements with third parties for such completion, to the AUTHORITY for Approval prior to beginning completion of the Work. Approval of such contracts shall be in accordance with all applicable requirements and procedures for Approval of subcontracts as stated in the Contract Documents.
- 14.2.5 After the notice of termination is issued, the Authority may take over the work and complete it by contract or otherwise and may take possession of and use materials, appliances, equipment or plant on the work site necessary for completing the work.
- 14.2.6 Rather than taking over the work itself, the Authority may transfer the obligation to perform the work from the contractor to your surety. The surety must submit its plan for completion of the work, including any contracts or agreements with third parties for completion, to the Authority for approval prior to beginning work. The surety must follow the Contract requirements for approval of subcontracts, except that the limitation on percent of work subcontracted will not apply.
- 14.2.7 On receipt of the transfer notice, the surety must take possession of all materials, tools, and appliances at the work site, employ an appropriate work force, and complete the Contract work, as specified. The Contract specifications and requirements shall remain in effect. However the Authority will make subsequent Contract payments directly to the Surety for work performed under the terms of the Contract. CONTRACTOR forfeits any right to claim for the same work or any part thereof. CONTRACTOR is not entitled to receive any further balance of the amount to be paid under the Contract.
- 14.2.8 Upon receipt of the notice terminating the services of the CONTRACTOR, the Surety shall enter upon the premises and take possession of all materials, tools, and appliances thereon for the purpose of completing the Work included under the Contract and employ by contract or otherwise any person or persons to finish the Work and provide the materials therefore, without termination of the continuing full force and effect of this Contract. In case of such transfer of employment to the Surety, the Surety shall be paid in its own name on estimates covering Work subsequently performed under the terms of the Contract and according to the terms thereof without any right of the CONTRACTOR to make any claim for the same or any part thereof.

- 14.2.9 If the Contract is terminated for default, the CONTRACTOR and the Surety shall be jointly and severally liable for damages for delay as provided by paragraph 11.8, and for the excess cost of completion, and all costs and expenses incurred by the AUTHORITY in completing the Work or arranging for completion of the Work, including but not limited to costs of assessing the Work to be done, costs associated with advertising, soliciting or negotiating for bids or proposals for completion, and other procurement costs. Following termination the CONTRACTOR shall not be entitled to receive any further balance of the amount to be paid under the Contract until the Work is fully finished and accepted, at which time if the unpaid balance exceeds the amount due the AUTHORITY and any amounts due to persons for whose benefit the AUTHORITY has withheld funds, such excess shall be paid by the AUTHORITY to the CONTRACTOR. If the damages, costs, and expenses due the AUTHORITY exceed the unpaid balance, the CONTRACTOR and his Surety shall pay the difference.
- 14.2.10 If, after notice of termination of the CONTRACTOR's right to proceed under the provisions of this clause, it is determined for any reason that the CONTRACTOR was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, or that termination was wrongful, the rights and obligations of the parties shall be determined in accordance with the clause providing for convenience termination.

14.3 Rights or Remedies:

Where the CONTRACTOR's services have been so terminated by the AUTHORITY, the termination will not affect any rights or remedies of the AUTHORITY against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due the CONTRACTOR by the AUTHORITY will not release the CONTRACTOR from liability.

14.4 Convenience Termination:

- 14.4.1 The performance of the Work may be terminated by the AUTHORITY in accordance with this section in whole or in part, whenever, for any reason the Contracting Officer shall determine that such termination is in the best interest of the OWNER. Any such termination shall be effected by delivery to the CONTRACTOR of a Notice of Termination, specifying termination is for the convenience of the AUTHORITY the extent to which performance of Work is terminated, and the date upon which such termination becomes effective.
- 14.4.2 Immediately upon receipt of a Notice of Termination and except as otherwise directed by the Contracting Officer, the CONTRACTOR shall:
- a. Stop Work on the date and to the extent specified in the Notice of Termination;
 - b. Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the Work as is not terminated;
 - c. Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination;
 - d. With the written Approval of the Contracting Officer, to the extent he may require, settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, the cost of which would be reimbursable, in whole, or in part, in accordance with the provisions of the Contract;

- e. Submit to the Contracting Officer a list, certified as to quantity and quality, of any or all items of termination inventory exclusive of items the disposition of which had been directed or authorized by the Contracting Officer;
- f. Transfer to the Contracting Officer the completed or partially completed record drawings, Shop Drawings, information, and other property which, if the Contract had been completed, would be required to be furnished to the AUTHORITY;
- g. Take such action as may be necessary, or as the Contracting Officer may direct, for the protection and preservation of the property related to the Contract which is in the possession of the CONTRACTOR and in which the AUTHORITY has or may acquire any interest.

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

14.4.3 When the AUTHORITY orders termination of the Work effective on a certain date, all Work in place as of that date will be paid for in accordance with Article 13 of the Contract. Materials required for completion and on hand but not incorporated in the Work will be paid for at invoice cost plus 15 % with materials becoming the property of the AUTHORITY - or the CONTRACTOR may retain title to the materials and be paid an agreed upon lump sum. Materials on order shall be cancelled, and the AUTHORITY shall pay reasonable factory cancellation charges with the option of taking delivery of the materials in lieu of payment of cancellation charges. The CONTRACTOR shall be paid 10% of the cost, freight not included, of materials cancelled, and direct expenses only for CONTRACTOR chartered freight transport which cannot be cancelled without charges, to the extent that the CONTRACTOR can establish them. The extra costs due to cancellation of bonds and insurance and that part of job start-up and phase-out costs not amortized by the amount of Work accomplished shall be paid by the AUTHORITY. Charges for loss of profit or consequential damages shall not be recoverable except as provided above.

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

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

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

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

- a. All costs and expenses reimbursable in accordance with the Contract not previously paid to the CONTRACTOR for the performance of the Work prior to the effective date of the Notice of Termination;
- b. So far as not included under "a" above, the cost of settling and paying claims arising out of the termination of the Work under subcontracts or orders which are properly chargeable to the terminated portions of the Contract;
- c. So far as practicable, claims by the contractor for idled or stand-by equipment shall be made as follows: Equipment claims will be reimbursed as follows:
 1. Contractor-owned equipment usage, based on the contractor's ownership and operating costs for each piece of equipment as determined from the contractor's accounting records. Under no circumstance, may the contractor base equipment claims on published rental rates.
 2. Idle or stand-by time for Contractor-owned equipment, based on your internal ownership and depreciation costs. Idle or stand-by equipment time is limited to the actual period of time equipment is idle or on stand-by as a direct result of the termination, not to exceed 30 days. Operating expenses will not be included for payment of idle or stand-by equipment time.
 3. Rented equipment, based on reasonable, actual rental costs. Equipment leased under "capital leases" as defined in Financial Accounting Standard No. 13 will be considered Contractor-owned equipment. Equipment leased from an affiliate, division, subsidiary or other organization under common control with you will be considered Contractor-owned equipment, unless the lessor has an established record of leasing to unaffiliated lessees at competitive rates consistent with the rates you have agreed to pay and no more than forty percent of the lessor's leasing business, measured in dollars, is with organizations affiliated with the lessor.

14.4.7 The CONTRACTOR shall have the right of appeal under the AUTHORITY's claim procedures, as defined in Article 15, for any determination made by the Contracting Officer, except if the CONTRACTOR has failed to submit his claim within the time provided and has failed to request extension of such time, CONTRACTOR shall have no such right of appeal. In arriving at the amount due the CONTRACTOR under this section, there shall be deducted:

- a. All previous payments made to the CONTRACTOR for the performance of Work under the Contract prior to termination;
- b. Any claim for which the AUTHORITY may have against the CONTRACTOR;
- c. The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the CONTRACTOR or sold pursuant to the provisions of this section and not otherwise recovered by or credited to the AUTHORITY; and,
- d. All progress payments made to the CONTRACTOR under the provisions of this section.

- 14.4.8 Where the Work has been terminated by the AUTHORITY said termination shall not affect or terminate any of the rights of the AUTHORITY against the CONTRACTOR or his Surety then existing or which may thereafter accrue because of such default. Any retention or payment of monies by the AUTHORITY due to the CONTRACTOR under the terms of the Contract shall not release the CONTRACTOR or his Surety from liability.
- 14.4.9 The contractor's termination claim may not include claims that pre dated the notice for termination for convenience. Those claims shall be prosecuted by the contractor under Article 15.
- 14.4.10 The contractor's termination claim may not exceed the total dollar value of the contract as awarded plus agreed upon change orders less the amounts that have been paid for work completed.
- a. Unless otherwise provided for in the Contract Documents, or by applicable statute, the CONTRACTOR, from the effective date of termination and for a period of three years after final settlement under this Contract, shall preserve and make available to the AUTHORITY at all reasonable times at the office of the CONTRACTOR, all its books, records, documents, and other evidence bearing on the cost and expenses of the CONTRACTOR under his Contract and relating to the Work terminated hereunder.
 - b. Cost Principles. The Authority may use the federal cost principles at 48 CFR §§ 31.201-1 to 31.205-52 (or succeeding cost principles for fixed price contracts) as guidelines in determining allowable costs under this Subsection to the extent they are applicable to construction contracts and consistent with the specifications of this Contract. The provisions of this contract control where they are more restrictive than, or inconsistent with, these federal cost principles.”

ARTICLE 15 - CLAIMS AND DISPUTES

15.1 Notification

- 15.1.1 The CONTRACTOR shall notify the AUTHORITY in writing as soon as the CONTRACTOR becomes aware of any act or occurrence which may form the basis of a claim for additional compensation or an extension of Contract Time or of any dispute regarding a question of fact or interpretation of the Contract. The AUTHORITY has no obligation to investigate any fact or occurrence that might form the basis of a claim or to provide any additional compensation or extension of Contract Time unless the CONTRACTOR has notified the AUTHORITY in writing in a timely manner of all facts the CONTRACTOR believes form the basis for the claim.
- 15.1.2 If the CONTRACTOR believes that he is entitled to an extension of Contract Time, then the CONTRACTOR must state the contract section on which he basis his extension request, provide the AUTHORITY with sufficient information to demonstrate that the CONTRACTOR has suffered excusable delay, and show the specific amount of time to which the CONTRACTOR is entitled. The AUTHORITY will not grant an extension of Contract Time if the CONTRACTOR does not timely submit revised schedules under **Section 01 32 00**.
- 15.1.3 If the matter is not resolved by agreement within 7 days, the CONTRACTOR shall submit an Intent to Claim, in writing, to the AUTHORITY within the next 14 days.
- 15.1.4 If the CONTRACTOR believes additional compensation or time is warranted, then he must immediately begin keeping complete, accurate, and specific daily records concerning every detail of the potential claim including actual costs incurred. The

CONTRACTOR shall provide the AUTHORITY access to any such records and furnish the AUTHORITY copies, if requested. Equipment costs must be based on the CONTRACTOR's internal rates for ownership, depreciation, and operating expenses and not on published rental rates. In computing damages, or costs claimed for a change order, or for any other claim against the Authority for additional time, compensation or both, the contractor must prove actual damages based on internal costs for equipment, labor or efficiencies. Total cost, modified total cost or jury verdict forms of presentation of damage claims are not permissible to show damages. Labor inefficiencies must be shown to actually have occurred and can be proven solely based on job records. Theoretical studies are not a permissible means of showing labor inefficiencies. Home office overhead will not be allowed as a component of any claim against the Authority.

- 15.1.5 If the claim or dispute is not resolved by the Project Manager, then the CONTRACTOR shall submit a written Claim to the Contracting Officer within 90 days after the CONTRACTOR becomes aware of the basis of the claim or should have known the basis of the claim, whichever is earlier. The Contracting Officer will issue written 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**

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

SC-1-DEFINITIONS

A. Add the following definitions:

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

SC-2.4-VISITS TO SITE/PLACE OF BUSINESS

At General Conditions Article 2.4, delete the first four words of the first sentence ("The Contracting Officer will ...") and replace with the following words "The Contracting Officer has the right to, but is not obligated to..."

SC-4.2-VISIT TO SITE

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

- "A. A formal visit to the site will occur as noted on the Invitation to Bid".

SC-4.3-EXPLORATIONS AND REPORTS

At General Conditions Article 4.3, add the following paragraph:

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

SC-5.4.1 – INSURANCE REQUIREMENTS

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

SC-5.4.2a – WORKERS COMPENSATION INSURANCE

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

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

SC-5.4.2d- BUILDER'S RISK INSURANCE

At General Conditions Article 5.4.2.d, delete the subsection in its entirety.

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-9.4–CHANGE ORDER

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

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

SC-11.3 – COMPUTATION OF CONTRACT TIME

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

SC-11.8–DELAY DAMAGES

At General Condition Article 11.8, add the following paragraphs:

PROJECT NO. 19056
CLARKS POINT AND PORT HEIDEN RPSU PROJECTS SITE CONSTRUCTION

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

11.8.2 If no money is due the CONTRACTOR, the AUTHORITY shall have the right to recover these sums from the CONTRACTOR, from the Surety, or from both. These are liquidated damages and not penalties. These charges shall reimburse the AUTHORITY for its additional administrative expenses incurred due to CONTRACTOR'S failure to complete the work within the time specified.

11.8.3 Permitting the CONTRACTOR to continue and finish the work or any part of it after the Contract time has elapsed or the completion date has passed does not waive the AUTHORITY'S rights to collect liquidated damages under this section.

SC-12.1-WARRANTY AND GUARANTEE

At General Condition Article 12.1, add the following sentence:

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

SC-12.6-CORRECTION OR REMOVAL OF DEFECTIVE WORK

At General Condition Article 12.6, add the following paragraphs:

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

SC – 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."

SC-15.6- Construction Contract Claim Appeals.

Delete 15.6 in its entirety.

END OF SECTION 00 80 00

REQUIRED CONTRACT PROVISIONS
For
FEDERAL-AID CONSTRUCTION CONTRACTS

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

I. GENERAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6. Training and Promotion:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. General:

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

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

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

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

2. Classification:

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

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

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

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

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

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

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

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

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

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

3. Payment of Fringe Benefits:

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

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

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

a. Apprentices:

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

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

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

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

b. Trainees:

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Payrolls and Payroll Records:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

VII. SUBLETTING OR ASSIGNING THE CONTRACT

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

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

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

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

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

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

VIII. SAFETY: ACCIDENT PREVENTION

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

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

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

IX. FALSE STATEMENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Certification Regarding Debarment,

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

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

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

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

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

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

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

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

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

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DIVISION 01 – GENERAL REQUIREMENTS

Section 01 11 13	Summary of Work
Section 01 12 19	Contractor's Certification of Subcontracts
Section 01 12 19	Subcontractor Certification Form
Section 01 26 63	Change Procedures
Section 01 29 73	Schedule of Values
Section 01 29 76	Application for Payment
Section 01 31 19	Project Meetings
Section 01 32 16	Construction Progress Schedule
Section 01 33 00	Submittal Procedures
Section 01 33 23	Shop Drawings, Product Data, and Samples
Section 01 42 19	Reference Standards
Section 01 45 00	Quality Control
Section 01 51 00	Construction Facilities
Section 01 60 00	Material and Equipment
Section 01 60 00A	Substitution Request Form
Section 01 64 00	Receipt of Owner Furnished Materials
Section 01 71 13	Mobilization and Demobilization
Section 01 71 23.16	Construction Surveying
Section 01 73 00	Execution Requirements
Section 01 74 00	Cleaning and Waste Management
Section 01 77 00	Contract Closeout Procedures
Section 01 78 39	Project Record Documents

DIVISION 02 – EXISTING CONDITIONS

Section 02 41 00	Demolition
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DIVISION 03 – CONCRETE

Section 03 30 00	Cast-In-Place Concrete
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DIVISIONS 04 – 05 (NOT USED)

DIVISION 06 – WOOD, PLASTICS, & COMPOSITES

Section 06 10 00	Rough Carpentry
Section 06 16 00	Sheathing
Section 06 17 53	Shop-Fabricated Wood Trusses

DIVISION 07 – THERMAL & MOISTURE PROTECTION

Section 07 21 00	Thermal Insulation
Section 07 41 13	Formed Metal Roof Panels
Section 07 42 13	Formed Metal Wall Panels
Section 07 43 13	Formed Vented Soffit Panels
Section 07 92 00	Joint Sealant

DIVISION 08 (NOT USED)

DIVISION 09 – FINISHES

Section 09 97 13.23	Exterior Steel Coatings
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DIVISIONS 10 – 20 (NOT USED)

DIVISION 21 – FIRE SUPPRESSION

Section 21 13 29.10	Fire Suppression
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DIVISION 22 (NOT USED)

DIVISION 23 – MECHANICAL

Section 23 05 00	Common Work Results for Mechanical
Section 23 05 29	Hangers and Supports for Piping and Equipment
Section 23 09 00	Instrumentation and Control Devices
Section 23 11 13	Fuel and Lube Oil Piping
Section 23 12 13	Fuel and Lube Oil Equipment and Specialties
Section 23 21 13	Hydronic Piping
Section 23 21 16	Hydronic Equipment and Specialties
Section 23 31 13	Metal Ducts and Ventilation Equipment
Section 23 35 16.10	Engine Exhaust and Crank Vent Piping

DIVISIONS 24 – 25 (NOT USED)

DIVISION 26 – ELECTRICAL

Section 26 05 00	Common Work Results for Electrical
Section 26 05 02	Basic Electrical Materials and Methods
Section 26 05 26	Grounding and Bonding for Electrical Systems
Section 26 05 29	Hangers and Supports for Electrical Systems
Section 26 05 33	Raceway and Boxes for Electrical Systems

DIVISIONS 27 – 30 (NOT USED)

DIVISION 31 – EARTHWORK

Section 31 05 19.13	Geotextiles
Section 31 10 00	Site Clearing
Section 31 22 00	Grading
Section 31 23 16	Excavation
Section 31 23 23	Fill

DIVISION 32 – EXTERIOR IMPROVEMENTS

Section 32 31 13	Chain Link Fences and Gates
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DIVISION 33 – UTILITIES

Section 33 61 13	Underground Hydronic Energy Distribution
Section 33 71 00.10	Overhead Electrical Utilities
Section 33 71 00.20	Underground Electrical Utilities
Section 33 71 16	Electrical Utility Poles
Section 33 72 16.10	Pole Mounted Liquid-Filled Transformers

APPENDIX A: Geotechnical Report for Clark's Point

APPENDIX B: Geotechnical Report for Port Heiden

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SECTION 01 11 13
SUMMARY OF WORK

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Related Requirements.
- B. Work covered by Contract Documents.
- C. Description of Work.
- D. Contract Method.
- E. Work by Others.
- F. Coordination.
- G. Access for Testing and Inspection.

1.2 RELATED REQUIREMENTS

- A. Section 00 70 00 – General Conditions.
- B. Section 00 80 00 – Supplementary Conditions.
- C. Section 01 29 73 - Schedule of Values.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work under this Contract consists of the construction of two each electric power generation systems; one for the community of Clark's Point and one for the community of Port Heiden as follows:
 - 1. Schedule A1: Clark's Point Rural Power System Upgrade Base Bid: Provide all labor, materials, and equipment required to construct the power system upgrade as described in 1.4 Description of Work below.
 - 2. Schedule A2: Clark's Point Rural Power System Upgrade Additive Alternate 1: Provide all labor, materials, and equipment required to construct the power system for connection to a future wind farm as described in 1.5 Description of Work below.

3. Schedule B: Port Heiden Power Plant Upgrade: Provide all labor, materials, and equipment required to construct the power plant upgrade as described in 1.6 Description of Work below.
- B. 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.

1.4 CLARK'S POINT BASE BID DESCRIPTION OF WORK

- A. Receive Owner Furnished materials including completed power plant module (module), loose ship module accessories, step up transformer, and ground sleeve. See Section 01 64 00 – Receipt of Owner Furnished Materials. Note that at the time of transfer, the module will be fully functional and completely tested with temporary piping and electrical connections as noted on the Drawings.
- B. Disassemble the module as required to prepare for shipping. The Drawings have notes describing points intended to allow disassembly with minimal disruption to equipment and systems. These are provided for guidance only. The Contractor shall be responsible to remove exterior features and cover work as required to ensure module systems will not be damaged in shipping.
- C. Drain engine coolant glycol as required and store in sealed drums for shipment with the module. Disconnect all batteries at the engines, emergency lights, and fire alarm panel.
- D. Waterproof the module for shipping. Plug or cover all exterior openings and penetrations then cover the entire module with reinforced shrink wrap or a custom fit tarpaulin. The Contractor shall be responsible to ensure that water does not get into the module during shipping and storage.
- E. Package for shipment all loose ship Owner furnished items and all removed items. The Contractor shall be responsible to protect items from damage and moisture during shipping and storage.
- F. Furnish all materials and equipment required for all on site construction.
- G. Mobilize the module, loose ship items, and all required materials to the project site in Clark's Point, Alaska.
- H. Provide temporary fuel system for existing power generator.

- I. Prepare the site including all clearing, grubbing and utility demolition.
- J. Provide geotechnical fabric.
- K. Procure local fill material, place, compact and grade.
- L. Provide trenching, backfill, compaction, warning tape, and insulation as required for heat recovery and electrical systems.
- M. Provide concrete foundations and slabs. Place and secure the module and stairs on the concrete foundations.
- N. Relocate existing fuel tank, place and secure on the concrete foundations.
- O. Re-assemble module including all piping and electrical systems. Reconnect batteries. Install ventilation system.
- P. Provide roof system over module.
- Q. Within 30 days of delivery of the module to the project site, make provisions to provide heat within the control room adequate to maintain minimum 50°F ambient temperature. The control room shall remain heated until acceptance of substantial completion.
- R. Provide fencing, traffic barricades, seeding, and other features indicated.
- S. Provide fuel system including piping, appurtenances, equipment, and associated electrical system.
- T. Provide heat recovery system including arctic pipe, piping, appurtenances, equipment, and associated electrical system.
- U. Pressure test, flush, and charge all piping systems as indicated.
- V. Install Owner furnished step up transformer and ground sleeve.
- W. Provide all underground and overhead electrical distribution except for the items specifically indicated to be furnished under Additive Alternate #1 in 1.5 Description of Work below. Demolish, modify, and connect to existing overhead electrical distribution as indicated.

- X. Provide a minimum of two weeks' notice to the Authority to schedule the substantial completion inspection. Prior to declaring the project substantially complete, perform all required tests of mechanical and electrical systems as required by the Contract Documents. Tasks shall include but not be limited to:
1. Pressure test all piping systems, flush, fill, and prime as indicated.
 2. Test all electrical circuits to confirm continuity, phase rotation, etc.
 3. Functionally test all mechanical and electrical equipment and all associated controls to confirm proper operation. Note that this includes all systems except for the engine-generators and the switchgear.
- Y. Upon substantial completion acceptance, the Authority will functionally test and commission the system. Tasks shall 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, heat recovery, plant heat, and ventilation.
 3. Final calibration of all mechanical and electrical instrumentation devices.
 4. Test of all data and communication systems to demonstrate proper operation of SCADA system and cameras including internet access.
- The Contractor shall provide technicians on site who are familiar with the system to assist with testing and to make corrections to any deficiencies found in the Work.
- Z. Upon completion of testing, thoroughly clean the module and all work areas. Remove all rubbish and debris and dispose of all waste in accordance with the Contract Documents and all applicable State and Federal regulations.

1.5 CLARK'S POINT ADDITIVE ALTERNATE #1 DESCRIPTION OF WORK

- A. Provide step up transformer bank for connection of a wind farm to the electrical distribution system including transformers, primary wiring, secondary wiring, and all required hardware and accessories. See Drawings for delineation of Work.
- B. Provide wind service panel including equipment, wiring, raceways, supports, and all required hardware and accessories.
- C. Install Owner furnished devices and provide devices required for communication between the wind service panel and the module including wiring, raceways, supports, and all required hardware and accessories.

1.6 PORT HEIDEN DESCRIPTION OF WORK

- A. Receive Owner Furnished materials including completed power plant module (module), loose ship module accessories, step up and step down transformers, and ground sleeves. See Section 01 64 00 – Receipt of Owner Furnished Materials. Note that at the time of transfer, the module will be fully functional and completely tested with temporary piping and electrical connections as noted on the Drawings.
- B. Disassemble the module as required to prepare for shipping. The Drawings have notes describing points intended to allow disassembly with minimal disruption to equipment and systems. These are provided for guidance only. The Contractor shall be responsible to remove exterior features and cover work as required to ensure module systems will not be damaged in shipping.
- C. Drain engine coolant glycol as required and store in sealed drums for shipment with the module. Disconnect all batteries at the engines, emergency lights, and fire alarm panel.
- D. Waterproof the module for shipping. Plug or cover all exterior openings and penetrations then cover the entire module with reinforced shrink wrap or a custom fit tarpaulin. The Contractor shall be responsible to ensure that water does not get into the module during shipping and storage.
- E. Package for shipment all loose ship Owner furnished items and all removed items. The Contractor shall be responsible to protect items from damage and moisture during shipping and storage.
- F. Furnish all materials and equipment required for all on site construction.
- G. Mobilize the module, loose ship items, and all required materials to the project site in Port Heiden, Alaska.
- H. Prepare the site including all clearing, grubbing and utility demolition.
- I. Provide geotechnical fabric, insulation, and membrane.
- J. Procure local fill material, place, compact and grade.
- K. Provide trenching, backfill, compaction, warning tape, and insulation as required for heat recovery and electrical systems.

- L. Provide concrete foundations and slabs. Place and secure the module and stairs on the concrete foundations.
- M. Re-assemble module including all piping and electrical systems. Reconnect batteries. Install ventilation system.
- N. Provide roof system over module.
- O. Within 30 days of delivery of the module to the project site, make provisions to provide heat within the control room adequate to maintain minimum 50°F ambient temperature. The control room shall remain heated until acceptance of substantial completion.
- P. Provide fencing and other features indicated.
- Q. Provide fuel system including piping, appurtenances, equipment, and associated electrical system.
- R. Provide heat recovery system including arctic pipe, piping, appurtenances, equipment, and associated electrical system.
- S. Pressure test, flush, and charge all piping systems as indicated.
- T. Install Owner furnished step up transformers and ground sleeves.
- U. Provide power factor correction reactors and all associated devices and wiring.
- V. Provide all underground electrical distribution including but not limited to primary and secondary conductors, raceways, sectionalizing cabinets, meter bases, and meters. Demolish, modify, and connect to existing underground electrical distribution as indicated.
- W. Provide a minimum of two weeks' notice to the Authority to schedule the substantial completion inspection. Prior to declaring the project substantially complete, perform all required tests of mechanical and electrical systems as required by the Contract Documents. Tasks shall include but not be limited to:
 - 1. Pressure test all piping systems, flush, fill, and prime as indicated.
 - 2. Test all electrical circuits to confirm continuity, phase rotation, etc.
 - 3. Functionally test all mechanical and electrical equipment and all associated controls to confirm proper operation. Note that this includes all systems except for the engine-generators and the switchgear.

- X. Upon substantial completion acceptance, the Authority will functionally test and commission the system. Tasks shall include but not be limited to:
1. Run through 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, heat recovery, plant heat, and ventilation.
 3. Final calibration of all mechanical and electrical instrumentation devices.
 4. Test of all data and communication systems to demonstrate proper operation of SCADA system and cameras including internet access.

The Contractor shall provide technicians on site who are familiar with the system to assist with testing and to make corrections to any deficiencies found in the Work.

- Y. Upon completion of testing, thoroughly clean the module and all work areas. Remove all rubbish and debris and dispose of all waste in accordance with the Contract Documents and all applicable State and Federal regulations.

1.7 CONTRACT METHOD

- A. This Contract is lump sum and is composed of multiple lump sum items as shown on 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.

1.8 WORK BY OTHERS

- A. The modules will be shop fabricated and tested by others and be provided to the Contractor as Owner Furnished materials. See Specification Section 01 64 00 – Receipt of Owner Furnished Materials. Assume full responsibility for protection and safekeeping of materials and products provided under this Contract.
- B. The Drawings have notes delineating Shop/On-Site work. All work described as being part of the Module Shop Fabrication scope is not part of this Contract and has been performed under a separate contract.

1.9 COORDINATION

- A. Coordinate Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
- B. Sequence Work to maximize worker efficiency and minimize construction time.

- C. Prior to procurement, verify that characteristics of interrelated equipment are compatible.
- D. Coordinate space requirements and installation of components. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.

1.10 ACCESS FOR TESTING AND INSPECTION

- A. Provide access for the Authority and the Engineer to the site. Provide on-site transportation, ladders, lifts, eye and ear protection, hard hats, appropriate and clean respiratory protection, etc. for inspections and testing of the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROJECT SCHEDULE CRITICAL DATES

August 1, 2019	Owner Furnished Transformers and Ground Sleeves Available for Pickup.
August 22, 2019	Owner Furnished Modules and Loose Ship Items Available for Pickup.
January 14, 2020	Substantial Completion for both projects. Begin Testing.
March 3, 2020	Final Completion for both projects.

END OF SECTION

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 and submit to the Authority prior to the start of work. 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

PROJECT: Clark's Point and Port Heiden RPSU Projects, ITB #19041

PROJ. #: TBD

Subcontractor Name: _____

c. Does the evidence of insurance list the Department 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 Notice on a form provided by the Authority. The Authority may respond by rejecting it, or with an RFP to initiate contract change. The Contractor's Change Notice 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 or Contingency Authorization, the basis of pricing shall be estimated. For work performed prior to the execution of a Change Order or Contingency Authorization, 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.
- B. IWAs may be issued to authorize the commencement of additional work in advance of the execution of a Change Order or Contingency Authorization.
- C. Work authorized by IWA shall be converted to a negotiated Change Order.
- D. The price on the IWA form shall be an estimated limit not to be exceeded by the Contractor without prior amendment of the IWA by the Authority. The Authority shall not be obligated to compensate the Contractor for costs in excess of the amount on the IWA.
- E. Upon the execution of an IWA, the Contractor is authorized to begin the specified work. The Contractor shall track its costs using Cost of Work procedures. The Contractor shall use the Authority's Cost of the Work form and shall submit the data to the Authority at the close of each work day. A separate Cost of Work form is required for each IWA.

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.
- 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.
- 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 and each authorized Contingency Authorization 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 or Contingency Authorizations and the inclusion of these change documents by reference on the Application for Payment form.
- D. Payment shall not be made for Work authorized via Interim Work Authorization.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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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. CPM Activity Number.
 - 2. CPM Activity Description.
 - 3. CPM 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 CPM 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: Unless specified elsewhere, the assigned values for mobilization and demobilization shall be based upon the estimated value of specified Work for each of these tasks.
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 CPM 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

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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 33 00 – Submittal Procedures.
- I. Section 01 45 00 – Quality Control.
- J. Section 01 51 00 – Construction Facilities.
- K. Section 01 77 00 – Contract Closeout Procedures.
- L. Section 01 78 39 – Project Record Documents.

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. 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 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 project 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.

1.4 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.

1.5 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. Progress Meeting shall be attended by all key Contractor personnel and, as appropriate, Subcontractor project personnel.
- C. 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.
- D. Progress Meetings will also be used to review other key aspects of the Work, such as safety, quality, critical items, etc.
- E. Meeting Minutes: The Contractor shall document the meetings and distribute minutes within 48-hours of adjournment. Minutes shall be typed, reflecting date, attendees followed by company or organization, who stated each item, and in format to facilitate correction of previous meeting minutes. Distribution shall be to all attendees and those affected by discussions or decisions made at meeting.

1.6 SAFETY MEETING

- A. The Contractor shall conduct Safety Meetings as required by its project Safety Program.
- B. The Contractor shall invite the Authority to attend Safety Meetings.

1.7 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

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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 33 00 – Submittal Procedures.

1.3 SUBMITTALS

- A. Within fifteen (15) days after date established in Notice to Proceed, submit preliminary schedule.
- B. Within ten (10) days after joint review, submit complete schedule.
- C. Submit updated schedule 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

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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 Product Specifications.
- N. Equipment Installation Data.

1.3 SUBMITTAL REGISTER

- A. Submit preliminary Submittal Register as required by Section 00 70 00 – General Conditions in the first **7** calendar days of the contract. 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.

1.4 CONTRACTOR REVIEW

- A. The Contractor shall prepare and review submittals as required by the provisions of Section 00 70 00 – General Conditions and Section 00 80 00 – Supplementary Conditions.

1.5 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 and 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.

1.6 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 (incomplete or improperly submitted submittals count as one of these submittals). The Contractor shall pay all review costs associated with more than 2 reviews.

1.7 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:

“No Exceptions Taken” – denotes that the submittal is generally consistent with the requirements of the Contract Documents. A resubmittal is not required.

“Approved as 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.

1.8 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

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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

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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. National Fire Protection Association (NFPA) NFPA 30.
 - 3. International Building Code (IBC).
 - 4. National Electrical Code (NEC).

5. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME).
6. American Petroleum Institute (API).
7. American Society of Testing and Materials (ASTM).
8. American Society of Mechanical Engineers (ASME).
9. American Welding Society (AWS).
10. American Institute of Steel Construction (AISC).
11. Manufacturers Standardization Society of the Valve and Fitting Industry (MSS).
12. Alaska Department of Environmental Conservation (ADEC) 18 AAC 75.
13. Steel Structures Painting Council (SSPC).
14. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.

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.
- B. 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 33 23 – Shop Drawings, Product Data, and Samples.
- D. Section 01 42 19 – Reference Standards.
- E. Section 01 60 00 – Material and Equipment.
- F. Technical Specifications (Division 21, 23, and 26): Contractor Qualifications, Quality Control, and Testing.

1.3 SUBMITTALS

- A. Submit documentation demonstrating compliance with required qualifications.
- B. Submit a Quality Control Plan for review and approval.
- C. Submit required progress reports in accordance with the Contract Documents.

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. Quality Control services are required to verify compliance with requirements specified or indicated and do not relieve the Contractor of responsibility for compliance with the Contract Documents.
- E. 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.
- F. 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 or approved, it shall be tested in the presence of the Authority after timely notice of its readiness for inspection and testing, and the work after testing shall be concealed only upon approval of Authority.
- B. The Authority shall have the right to witness all tests. The Contractor shall notify the Authority at least seven (7) calendar days prior to testing.
- C. 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.
- D. 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.

- E. 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 five (5) calendar days of manufacturer's field services. Provide three (3) copies and a digital version.

PART 2 – PRODUCTS

2.1 CONTRACTOR QUALIFICATION TECHNICAL 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.
- B. In accordance with Alaska statutes 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.
- C. In accordance with Alaska statutes 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.

- D. 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.
- E. All Fire Suppression work shall be performed by a contractor that meets the qualifications listed under Division 21 Specifications.

PART 3 – EXECUTION

3.1 GENERAL

- A. The Contractor shall provide full and complete documentation of Quality Control procedures and activities in a Quality Control Program and Quality Control Testing Plan.

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 to ensure full access by Special Inspectors and Quality Assurance testing personnel to work, work performance, and testing preparation, operations and results.
- 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.
 - e. Contractor Deficiency Reports and punch lists as appropriate to the level of completion of the Work.
 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 and submit to the Authority the following Quality Control records and reports:
 - 1. Daily Reports: The Contractor shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. The Daily 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. One copy of each Daily Report shall be submitted to the Authority on a weekly basis.
 - 2. 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 the required written reports.
 - 3. Non-Conformance Report: Contractor shall submit a weekly Non-Conformance Report to the Authority identifying all substandard inspections and tests taken during the week, including identification by Specification section and schedule activity of the inspection or test, location and nature of defects, causes for rejection and remedial actions taken or proposed. The Non-Conformance Report shall also identify corrective actions taken or proposed for any open items on prior Non-Conformance Reports including a scheduled date for resolution of each item. The Non-Conformance Report shall be submitted and discussed in Progress Meetings.
 - 4. Inspection Control Log: Contractor shall maintain an inspection control log chronologically recording each inspection and test performed by the Contractor, including the nature of the inspection, test or retest, the date performed, the results, causes for rejection, remedial action or corrective

action taken and dates of subsequent inspections and retests, and final acceptance. The Contractor shall submit the updated Inspection Control Log weekly to the Authority; the Log will be discussed in Progress Meetings.

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 insures 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

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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. Unless specified elsewhere, the Contractor shall make their own provisions for temporary electrical service.
- B. Provide lighting for construction operations.

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, to protect 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 SANITARY FACILITIES

- A. Unless specified elsewhere, provide and maintain required facilities and enclosures.

1.7 TEMPORARY TELEPHONE SERVICE

- A. Unless specified elsewhere, provide, maintain and pay for telephone service to the Contractor field offices.

1.8 FREEZE PROTECTION

- A. Provide freeze protection for the Power Plant Module in accordance with Section 01 11 13 – Summary of Work.

1.9 CONSTRUCTION FENCES

- A. Include all supplementary parts necessary or required for a complete and satisfactory installation of temporary fences. All runs of the fence shall present the same general appearance.
- B. Material requirements, unless shown otherwise on the Drawings:
 - 1. Fabric: No. 9 ASW gage zinc coated or approved equal.
 - 2. Barbed Wire (Zinc-coated): 3-strand twisted No. 12-1/2 ASW gage galvanized steel wire with 4-point barbs of No. 14 ASW gage galvanized steel wire, or approved equal. The barbs shall be spaced approximately 4 inches apart.
 - 3. Wire ties and tension wire: No. 7 ASW gage marcelled steel wire with same coating as fabric and conforming to ASTM A824.
 - 4. Plywood, if used shall be painted.
- C. Other requirements:
 - 1. Used materials may be installed provided the used materials are good, sound, and are suitable for the purpose intended.
 - 2. Posts and braces shall be galvanized steel pipe conforming to the requirements of ASTM F1038 and sized in accordance with Tables 1 through VI of Federal Specifications RR-F-191/3. Posts shall be spaced more than 10 feet apart.
 - 3. Galvanizing of steel items will be required.
 - 4. Temporary fences that are damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

5. If no longer required for the Work as determined by the Authority, temporary fences shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work.
6. In secure areas away from traffic, fence shall be 8 feet high. Fence construction shall include top and bottom tension wires. All fabric tension wire and barbed wire shall be installed taut with no more than 2-inch open gaps between bottom of fence and underlying surface.

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. Remove CONSTRUCTION FACILITIES, Services, Utilities and other related materials, prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- 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 SHORING AND BRACING

- A. The Contractor is responsible for providing shoring and bracing required to accomplish the Work. This includes shoring of adjacent facilities, shoring for installed work, and shoring and bracing for installation of structural steel.
- B. The Contractor's shoring and bracing shall be designed by an Alaska registered structural engineer.

- C. Provide a sealed and signed copy of shoring and bracing calculations to the Authority for informational purposes only. The submission of calculations to the Authority shall not transfer responsibility for the design of shoring and bracing to the Authority. Rather, the Authority will receive the calculations to verify they have been done by a registered engineer.

1.14 COST RESPONSIBILITY

- A. Except as otherwise noted, the cost of 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 60 00 – Material and Equipment.
- I. 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, 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 90 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: Clark's Point and Port Heiden RPSU Projects, ITB #19056

Project No.: TBD

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

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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. Clark's Point Module: One (1) each steel modular power plant. The module construction was performed under a separate contract as detailed on the Drawings. The module will be fully assembled, functionally tested, and approved by the Authority prior to transfer to the Contractor. The overall module dimensions are 45' long by 15' wide by 13' high and the total weight is estimated to be 80,000#. The module will be staged at Weona Corporation, 10501 Olive Lane, Anchorage, AK 99515. The Contractor will make arrangements with the Authority to receive the module at this location and take possession.
- B. Clark's Point Module Loose Ship Accessories: Two (2) each fabricated steel stair assemblies, two (2) each 55-gallon drums ethylene glycol coolant, two (2) each exhaust hoods, and three (3) each intake duct systems. The loose ship items will be staged at Weona Corporation, 10501 Olive Lane, Anchorage, AK 99515. The Contractor will make arrangements with the Authority to receive the material at this location and take possession.
- C. Clark's Point Transformers: One (1) each 150kVA pad mount step up transformer and associated fiberglass ground sleeve. The transformer and ground sleeve will be staged at the Authority Warehouse at 2601 Commercial Drive, Anchorage, AK 99501. The Contractor will make arrangements with the Authority to receive the material at this location and take possession.

- D. Port Heiden Module: One (1) each steel modular power plant. The module construction was performed under a separate contract as detailed on the Drawings. The module will be fully assembled, functionally tested, and approved by the Authority prior to transfer to the Contractor. The overall module dimensions are 45' long by 15' wide by 13' high and the total weight is estimated to be 80,000#. The module will be staged at Weona Corporation, 10501 Olive Lane, Anchorage, AK 99515. The Contractor will make arrangements with the Authority to receive the module at this location and take possession.
- E. Port Heiden Module Loose Ship Accessories: Two (2) each fabricated steel stair assemblies, two (2) each 55-gallon drums ethylene glycol coolant, two (2) each exhaust hoods, and three (3) each intake duct systems. The loose ship items will be staged at Weona Corporation, 10501 Olive Lane, Anchorage, AK 99515. The Contractor will make arrangements with the Authority to receive the material at this location and take possession.
- F. Port Heiden Transformers: One (1) each 225kVA pad mount step up transformer and associated fiberglass ground sleeve, one (1) each 45kVA pad mount step down transformer and associated fiberglass ground sleeve, and , one (1) each 15kVA pad mount step down transformer and associated fiberglass ground sleeve. The transformers and ground sleeves will be staged at the Authority Warehouse at 2601 Commercial Drive, Anchorage, AK 99501. The Contractor will make arrangements with the Authority to receive the material at this location and take possession.

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 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. CONTRACTOR's work to prepare Site for Work under Contract and to marshal workers, materials and equipment, and those of subcontractors, to accomplish the Work.
 - 2. Mobilization of all construction equipment, materials, suppliers, appurtenances, and the like, staffed and ready for commencing and prosecuting the Work, and the subsequent demobilization and removal from the site of said equipment, appurtenances, and the like upon completion of the Work.
 - 3. Assembly and delivery to the site equipment, materials, and supplies necessary for the prosecution of Work which are not intended to be incorporated in the Work; the clearing of and preparation of the Contractor's work area; the complete assembly, in working order, of equipment necessary to perform the required work; personnel services preparatory to commencing actual work; all other preparatory work required to permit commencement of the actual work on construction items for which payment is provided under the Contract.

1.4 REQUIREMENTS

- A. Haul routes, staging areas, and equipment positioning at the project site will be subject to approval by Authority, who will coordinate with Contractor to determine requirements and locations.
- B. Cooperate with 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 Authority for use of utilities and construction facilities.
- F. Coordinate field engineering and layout Work under instructions of Authority.
- G. Walk through Site with 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 Authority, submit a plan of the proposed layout of the construction site, including equipment, accessways, temporary facilities, staging, and storage areas, within thirty (30) days 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 local governing body, 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

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SECTION 01 71 23.16
CONSTRUCTION SURVEYING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Construction surveying requirements.

1.2 RELATED REQUIREMENTS

- A. Existing survey data and survey control are presented on the Drawings.
- B. Section 01 33 00 – Submittal Procedures.

1.3 SUBMITTALS

- A. Submit, upon request of the Engineer, copies of all field notes and survey data.
- B. Provide marked-up as-built drawings.

PART 2 – PRODUCTS

2.1 SURVEY MATERIALS

- A. Provide all construction surveying and staking materials to stake construction work.

PART 3 – EXECUTION

3.1 SURVEYING BY ENGINEER

- A. No surveying will be provided by the Engineer.

3.2 CONTRACTOR RESPONSIBILITIES

- A. Contractor shall set all lines and grades by instrument survey in order to correctly layout the following:
 - 1. Building foundation.
 - 2. Proposed Utilities.
 - 3. All other Construction.

- B. Contractor shall provide vertical and horizontal as-built locations of buried utilities.
- C. Contractor shall locate and protect all survey reference points. Contractor shall have a Professional Land Surveyor, licensed in the State of Alaska, reset any survey points that have been disturbed at Contractor's expense.
- D. Survey shall be tied to the basis of horizontal and vertical control indicated on the Drawings.
- E. Provide and pay for all surveying as required for project completion and acceptance.
- F. All survey work shall be by, or under the direct supervision of, a licensed Professional Land Surveyor registered in the State of Alaska.
- G. Field-adjust grades to meet the minimum fill depth required by the Drawings.

3.3 ACCURACY AND TOLERANCES

- A. Contractor's surveys shall be subject to the following tolerances, unless another tolerance is specified elsewhere in the Contract Documents:
 - 1. Building Foundation: $\pm 1/4$ -inch in 10 foot.
 - 2. All other Construction:
 - a. ± 0.10 feet horizontally.
 - b. ± 0.10 feet vertically.

3.4 RECORDS

- A. Maintain a complete, accurate, and reduced set of field notes of all survey work.

END OF SECTION

SECTION 01 73 00
EXECUTION REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for addressing defects, cleaning, spare parts, 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 Project Manager.

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 Project Manager.
3. Surface corrosion exceeding five percent (5%) of the surface area shall be considered a 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 Project Manager.

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 hazard. 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 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified in individual Specification sections. 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.

1.9 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, similar to O&M Manual.
- 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.

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 of those portions of the project which his work affects.
 - 1. Contractor shall remove from the facility all tools, equipment, surplus materials, debris, temporary structures, and other material not incorporated in the permanent installation.
- B. Restoration of Damaged Property: To the extent that any roads, 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.
- C. Cleaning, repair, and restoration must be accomplished prior to Final Inspection, to the satisfaction of, and at no additional cost to the Authority.
- D. 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. Demolition Material.
 - 1. Not Used.

- B. General Construction Waste.
 - 1. General construction 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 71 23.16 – Construction Surveying.
- G. Section 01 73 00 – Execution Requirements.
- H. Section 01 78 39 – Project Record Documents.

1.3 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. The Authority will consider the Contractor's request for Substantial Completion only when:

1. Written request for Substantial Completion is provided at least fourteen (14) calendar days in advance of the Authority's scheduled Substantial Completion inspection date.
 2. List of items to be completed or corrected is submitted.
 3. All commissioning requirements have been met.
 4. All equipment and systems have been tested, adjusted, are properly operating and fully operational.
 5. All automated and manual controls are fully operational.
 6. Operation of all equipment and systems has been demonstrated to the Authority or their designated representative.
 7. Certificate of Occupancy is submitted.
 8. Certificates of Inspection for required inspections have been submitted for all required inspections.
 9. Project Record Documents for the Work or the portion of the Work being accepted are submitted and approved.
 10. Spare parts and maintenance materials are turned over to the Authority.
 11. All keys are turned over to the Authority.
 12. All warranties and bonds are submitted and approved.
 13. Final cleaning has been completed to the satisfaction of the Authority.
- B. When all of the preceding requirements for the consideration of Substantial Completion have been met, the Authority will conduct a scheduled Substantial Completion inspection with its Architect/Engineers and other required representatives. 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 have fourteen (14) days to 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.
- F. No progress payments will be made for Substantial Completion until all required submittals have been submitted and accepted by the Authority.

1.4 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. 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.

1.5 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.

1.6 FINAL ACCEPTANCE

- 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: Warranty/Bonds.
 2. Contractor's transmittal letter: Record Documents.
 3. Spare parts, maintenance materials receipts.
 4. Contractor's transmittal letter: Keys & keying schedule.
 5. Contractor's certification of insurance.
 6. EEO compliance certification (Federally funded projects only).
 7. Submittals and miscellaneous registers.
 8. Original final pay estimate.
 9. Contractor's release.
 10. Authority of Labor Notice of Completion (NOC).
 11. 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 may make final payment and issue a letter of Final Acceptance.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

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

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, and Samples.
- E. Section 01 71 23.16 – Construction Surveying
- F. Section 01 77 00 – Contract Closeout Procedures.
- G. Individual Specifications Sections: Manufacturer's certificates and certificates of inspection.

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

- 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, product data, and samples.
 - 6. Field test records.

7. Field survey notes.
 8. Inspection certificates.
 9. Manufacturer's certificates.
- B. Prior to Substantial Completion, provide original or legible copies of each item maintained by the Contractor in other Sections, as listed by Specification sections in Paragraphs 1.2.B, C, and D above.
 - C. Delegate responsibility for management of maintenance of Record Documents to one person on the Contractor's staff as approved in advance by Project Manager.
 - 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. Keep record documents and samples available for inspection by the Authority.
 - K. 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.

- L. The Authority's approval of the current status of Record Documents will be prerequisite to the Authority's approval of requests for progress payments and request for final payment.
 - 1. Prior to submitting each request for progress payment, secure the Authority's approval of Record Documents as currently maintained.
 - 2. Prior to submitting request for Final Payment, obtain the Authority's approval of final Record Documents.
- M. Do not use job set for any purpose except entry of new data and for review and copying by the Authority.

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 SUBMITTALS

- 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 of built site elements.

1.2 RELATED REQUIREMENT

- A. Section 31 23 23 – Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.3 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. USACE EM 385-1-1 Safety and Health Requirements Manual.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SCOPE

- A. Remove items selected 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.
- 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 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete requirements.
- B. Reinforcing steel bars, wire fabric, and accessories for cast-in-place concrete.

1.2 RELATED REQUIREMENT

- A. Section 01 71 23.16 – Construction Surveying.

1.3 REFERENCES

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International.
- B. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- C. ACI 301 – Structural Concrete for Buildings.
- D. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- E. ACI 305R – Hot Weather Concreting.
- F. ACI 306R – Cold Weather Concreting.
- G. ACI 308 – Standard Practice for Curing Concrete.
- H. ACE 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures, and as modified by Interim Reports.
- I. ACI 318 – Building Code Requirements for Reinforced Concrete.
- J. ACI 347 – Guide to Formwork for Concrete; American Concrete Institute International.
- K. ASTM A182 – Cold-Drawn Steel Wire for Concrete Reinforcement.

- L. ASTM A615 – Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
- M. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- N. ASTM C33 – Concrete Aggregates.
- O. ASTM C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- P. ASTM C94 – Ready Mixed Concrete
- Q. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement Concrete.
- R. ASTM C150 – Standard Specification for Portland Cement.
- S. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
- T. ASTM C173/C173M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- U. ASTM C192 – Making and Curing Concrete Test Specimens in the Laboratory.
- V. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
- W. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- X. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete.
- Y. ASTM C685/C685M – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- Z. ASTM C881/C881M – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- AA. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- AB. ASTM D1850 – Concrete Joint Sealer, Cold-Application Type.

- AC. CRSI 63 – Recommended Practice for Placing Reinforcing Bars.
- AD. CRSI 65 – Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature.

1.4 SUBMITTALS

- A. Product Data
 - 1. Air-entraining admixture.
 - 2. Water reducing admixture.
- B. Shop Drawings: Submit detailed drawings indicating bar sizes, spacing, location, and quantities of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.
- C. Miscellaneous:
 - 1. Mix design: Submit proposed mix design of each class of concrete for review prior to commencement of Work, including delivery of concrete components. The mix design shall be newly prepared for the specific components intended for use in the project.
 - 2. Identify individual(s) responsible for installation of concrete flatwork. The responsible individual(s) shall demonstrate a minimum of 5 years' experience and demonstrate a minimum of 10 similar flatwork projects.
 - 3. Manufacturer's installation instructions: Indicate installation procedures and interface required with adjacent work for sealer-hardener and joint sealer.
 - 4. Submit results of cylinder breaks, entrained air test, and slump tests.
 - 5. Accurately record actual locations of embedded utilities and components which are concealed from view.
 - 6. Welding procedure where required for grounding purposes.
 - 7. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63 and 65; ACI 301,304, 315, and 318; and ASTM A184.
- B. Maintain one copy of each document on site.

- C. Conform to ACI 305R when concreting during hot weather.
- D. Conform to ACI 306R when concreting during cold weather.

1.6 COORDINATION

- A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.
- B. Coordinate the placement of threaded rods with tank and module skids.
- C. Verify grounding requirements are in conformance with Contract Documents.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type I, II, or III.
- B. Coarse Aggregate: ASTM C33, Size 67.
- C. Intermediate Aggregate ASTM C33, Grade 8.
- D. Fine Aggregate: ASTM C33, Concrete Sand.
- E. Mixing Water: Fresh, clean, and potable.
- F. Air-Entraining Admixture: ASTM C260, MB AE-90 or approved equal.
- G. Chemical Admixture: ASTM C494, Type A, water reducing.
- H. Joint Filler: ASTM D1751, 1/2-inch thick, unless otherwise indicated.
- I. Joint Sealant: ASTM D1850, for horizontal joints, inside buildings.
- J. Non-Shrink Grout: Non shrink type, pre mixed compound consisting of non- metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- K. Cement Grout: Consisting of cement, fine aggregate, and water.

- L. Reinforcing Steel: Install ASTM A-615 grade 40 or 60 reinforcing bars epoxy coated in accordance with ASTM A-775; to be installed in accordance with ACI 315, size and quantity as indicated. Place concrete in accordance with ACI 304.
- M. Miscellaneous steel parts shall be A36 unless noted otherwise.
- N. Miscellaneous stainless steel shall be A316 unless noted otherwise.

2.2 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces.
 - 3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.
 - 5. Filler Strips for Chamfered Corners: Wood strip type; 3/4 x 3/4-inch size; maximum possible lengths. Chamfer outside corners of exposed concrete.

2.3 MIX DESIGN – CAST IN PLACE CONCRETE

- A. The Contractor shall furnish all aggregate for cast-in-place concrete and a material sample shall be submitted to ensure compliance with the Specifications.
- B. The design of the concrete mixes using the materials specified shall be the responsibility of the Contractor as in accordance with ASTM requirements. The concrete shall be Type C and have the following characteristics:
 - 1. Compressive strength at 28 days shall be not less than 3,500 psi.
 - 2. The strength of the concrete proposed for use shall be established by testing prior to beginning concreting operation. A test consists of the average of three cylinders made and cured in accordance with ASTM C192 and tested in accordance with ASTM C39.
 - 3. Slump shall not be more than 4 inches for vibrated concrete tested in accordance with ASTM C143.
 - 4. Air-entrainment is required for all concrete and shall be 6.5 percent +/- 1- 1/2 percent.

5. Maximum water-to-cement ratio shall not exceed 0.45, consistent with ACI recommendations for minimum shrink concrete.
6. Maximum Aggregate Size: 3/4 inch.

2.4 REINFORCEMENT

- A. Reinforcing Steel: Install ASTM A-615 grade 40 or 60 reinforcing bars epoxy coated in accordance with ASTM A-775; to be installed in accordance with ACI 315, size and quantity as indicated. Place concrete in accordance with ACI 304.
- B. Welded Steel Wire Fabric: ASTM A185 Plain Type in flat sheets; plain finish.

2.5 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.6 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice, ACI 318, and ASTM A184.
- B. Weld reinforcement in accordance with UBC Standard 19-1 and ANSI/AWS D1.4-92.
- C. Locate reinforcing splices not indicated on Drawings, at point of minimum stress. Review location of splices. Minimum lap shall be 36 bar diameters, 24" minimum.
- D. Cold bending shall be in accordance with IBC and ACI recommendations.

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

3.3 MIXING

- A. Materials shall be stored, batched, and mixed as specified in ASTM C94.
 - 1. Job-Mixed: Mix concrete at the job site in a batch mixer in the manner specified for stationary mixers in ASTM C94.
 - 2. Hand-Mixed: Hand-mixed concrete will be permitted only when such use is approved by Engineer, but in no case in amounts exceeding one sack of cement per batch. Proportions for concrete shall be one part cement to five parts aggregate. Accomplish mixing in a manner to obtain required consistency and strength.

3.4 PLACING CONCRETE

- A. Contractor shall field verify compaction of structural fill under foundation prior to placing concrete foundations.
- B. Place concrete in accordance with ACI 301, ACI 304, and ACI 318.
- C. Notify Engineer minimum 24 hours prior to commencement of operations.
- D. Ensure reinforcement, inserts, embedded parts, and other accessories are not disturbed during concrete placement.
- E. Composite slab, provide closures necessary to contain the concrete during the pour.
- F. Place concrete continuously between predetermined construction, or indicated contraction joints.
- G. Do not interrupt successive placement; do not permit cold joints to occur within the construction joints.
- H. Screed floor slabs maintaining surface flatness of maximum 1/4-inch in 10 feet. Slope floor as shown on the Drawings.

3.5 PLACING REINFORCEMENT

- A. Provide contraction joints, either formed or saw cut to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position.

- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Conform to applicable code and details on Drawings for concrete cover over reinforcement.

3.6 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth trowel finish.
- B. Finish concrete landing surfaces with a non-slip broomed finish.
- C. Edge Finishing: Before final finishing is completed and before the concrete has taken its initial set, all edges in contact with the forms shall be tooled with an edger having three-eighth (3/8) inch radius.

3.7 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures in accordance with ACI 305 and ACI 306, and mechanical injury. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening of concrete and minimizing of shrinking cracks.
- C. Cure surfaces in accordance with ACI 301. Begin curing immediately following form removal.
- D. Impervious Sheeting: Except during cold weather concreting, wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges.

3.8 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301.
- B. Provide free access to Work and cooperate with appointed firm.

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

3.9 PATCHING

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

3.10 DEFECTIVE CONCRETE

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

END OF SECTION

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DIVISIONS 04 – 05

(NOT USED)

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. This section covers the work necessary to install the module roof system as shown on the Drawings.

1.2 RELATED REQUIREMENTS

- A. Section 01 60 00 – Material and Equipment.
- B. Section 01 74 00 – Cleaning and Waste Management.
- C. Section 06 16 00 – Sheathing.

1.3 REFERENCE STANDARDS

- A. PS 20 – American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.
- B. WWPA G-5 – Western Lumber Grading Rules; Western Wood Products Association; 2011.

1.4 SUBMITTALS

- A. Manufacturer's Certificate: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - 1. Power-driven fasteners.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.
 - 3. Species: Hem or Douglass Fir, unless otherwise indicated.
 - 4. Grade: No. 2 or better.

2.2 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified.
- B. Power-Driven Fasteners: NES NER-272.
- C. Wood screws: ASME B18.6.1.
- D. Bolts: Wood to steel or wood to wood, Structural Bolts, Nuts, and Washers: ASTM A307, medium carbon, galvanized, with matching compatible nuts and washers.

2.3 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. List of manufacturers.
- B. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:
 - 1. Alpine Engineered Products, Inc.
 - 2. Cleveland Steel Specialty Co.
 - 3. Harlen Metal Products, Inc.
 - 4. KC Metals Products, Inc.

5. Simpson Strong-Tie Co., Inc.
 6. Southeastern Metals Manufacturing Co., Inc.
 7. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, which meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction", unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule", in ICC's International Building Code.
 3. Table 23-II-B-1, "Nailing Schedule", and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule", in ICBO's Uniform Building Code.

4. Table 2305.2, "Fastening Schedule", in BOCA's National Building Code.
5. Table 2306.1, "Fastening Schedule", in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members", and Table R602.3(2), "Alternate Attachments", in ICC's International Residential Code for One- and Two-Family Dwellings.
7. Table 602.3(1), "Fastener Schedule for Structural Members", and Table 602.3(2), "Alternate Attachments", in ICC's International One- and Two-Family Dwelling Code.

3.2 PROTECTION

- A. Do not burn scrap on project site.
- B. Do not burn scraps that have been pressure treated.
- C. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

END OF SECTION

SECTION 06 16 00
SHEATHING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Roof Sheathing.

1.2 WORK INCLUDED

- A. This section covers the work necessary to install the module roof sheathing as shown on the Drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

PART 2 – PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1 unless otherwise indicated.

2.2 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior sheathing.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, “Fastening Schedule”, in the ICC's International Building Code.
 - 2. Table R602.3(1), “Fastener Schedule for Structural Members”, and Table R602.3(2), “Alternate Attachments”, in the ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Block all diaphragm roof panel edges with 2 x 4 flat blocking.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, “Engineered Wood Construction Guide”, for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Wood roof trusses.

1.2 WORK INCLUDED

- A. This section covers the work necessary to install the module roof wooden trusses as shown on the Drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal-truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sized, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by an engineer licensed to practice in the State of Alaska.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For metal-plate-connected wood trusses, signed by officer or truss-fabricating firm.

- B. Evaluation Reports: For the following, from ICC-ES
 - 1. Metal-plate connectors.
 - 2. Metal-truss accessories.

1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in PTI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses".

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Trusses shall be designed for the gravity loads, wind and seismic later and uplift loads, and support conditions as indicated on the Drawings and Specifications. No duration of load increase in stresses will be allowed for snow loading. Unbalanced snow and drift loading is required. Submit truss designs stamped by an engineer licensed to practice in the State of Alaska. Truss drawings shall indicate all materials of construction.
- B. Wood truss design criteria shall be in accordance with the 2012 International Building Code and ASCE/SEI 7-10 "Minimum Design Loads for Buildings and Other Structures". Design shall use the parameters listed on the Drawings.
 - 1. Trusses shall be designed, or supplemented, for anticipated shipping and handling loads.

- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and it's "Supplement".

2.2 GENERAL REQUIREMENTS

- A. Dimension Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.
 - 3. Species: Hem or Douglass Fir, unless otherwise indicated.
 - 4. Grade No. 2 or better.

2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B), G60 coating designation; and not less than 0.036 inches thick.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, or in an area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153 M.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand the same loads as the anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or by hydraulic press.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI 1 recommendation and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 06 10 00 – Rough Carpentry.
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION

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SECTION 07 21 00
THERMAL INSULATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Polystyrene foam-plastic board.
- B. Mineral-wool blanket.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 31 23 23 – Fill.
- C. Section 33 61 13 – Underground Hydronic Energy Distribution.

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: AASHTO M 230, Type VI, except that extrusion is not required and the 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 the following:

1. Insulation under concrete foundations: 60 psi.
2. Insulation over buried arctic pipe: 25 psi.

PART 3 – EXECUTION

3.1 PREPARATION

- 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.

3.2 CONSTRUCTION OF INSULATION BOARD

- A. Set each board accurately to the line and grade established and anchor firmly in place.
- B. Do not compact fill over insulation until it is completely thawed through its entire thickness.
- C. Use caution and appropriate construction techniques to ensure the insulation is protected and not damaged during formation of embankments.
- D. Remove and replace, at no cost to the Owner, any insulation that has been damaged or displaced.

END OF SECTION

SECTION 07 41 13
FORMED METAL ROOF PANELS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal roof panels.
- B. Flashing and trim integral to roof panels.
- C. Clips, anchoring devices, fasteners, and accessories for installation of panel system.

1.2 SUBMITTALS

- A. Submit the following:
 - 1. Product Literature and data sheets for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.
 - 3. Calculations demonstrating attachment complies with the design loads on the Structural Drawings.

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 PERFORMANCE REQUIREMENTS

- A. Structural and Wind Load Tests:
 - 1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/240.

2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.
3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7 foot purlin spacing and 166 psf when tested on 5-foot purlin spacing.

1.5 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty year limited warranty on paint finish for adhesion to the substrate and a thirty year limited warranty on chalk and color fade.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span or approved equal.

2.2 MATERIALS

- A. Standing Seam Metal Roof Panels: AEP Span-Lok HP 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. Fabricated panel with integral continuous overlapping seams suitable for continuous crimping by mechanical means during installation.
 - 3. Seam Height: 2" high ribs @ 16" centers.
 - 4. Provide pre-installed, high grade, hot-melt elastomeric sealant or butyl mastic, within the confines of panel's female leg, designed to seal against adjacent male panel leg.
 - 5. Minimum Thickness: 24 gauge (0.0250 inch) or as indicated on Drawings.
- B. Panel Finish:
 - 1. Exterior Finish: Cool Dura Tech 5000, color cool Forest Green.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Clips, anchoring devices, fasteners, and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick. Grace Ice and Water Shield, or approved equal.

2.4 SNOW FENCE

- A. Provide snow fence system as shown on the Drawings. The snow fence shall be a complete system that is compatible with the roof panels and is engineered for the application.
- B. The number of rows indicated on the Drawings is the minimum quantity. If the calculations indicate more, provide additional rows as required. If the calculations indicate less, provide the minimum quantity shown on the Drawings. Install first row 12" above the eave and second row 12" above the bearing wall.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
 - 1. Overall rake to rake tolerances plus or minus 2 inches or plus or minus 1 inch at each rake.
 - 2. Overall eave to ridge tolerance plus or minus 1 inch or plus or minus 1/2 inch at the eave, end lap and ridge.
 - 3. Vertical deviation from the nominal roof plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length and plus or minus 1/2 inch over the entire roof area.
- C. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- D. Correct defective conditions before beginning work.
- E. If substrate is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using clips and fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form seams with manufacturer-approved motorized or hand seaming tool. Completely engage panel, clip, and factory-applied sealant in seam.

- D. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- E. Install flashing and trim true and in proper alignment.
- F. Protective film on trim shall be removed before exposure to sunlight.
- G. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight

3.4 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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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. Submit the following:
 - 1. Product Literature for each material used.
 - 2. Manufacturer's surface preparation and 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 PERFORMANCE REQUIREMENTS

- A. Structural and Wind Load Tests:
 - 1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/240.
 - 2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.

3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7-foot purlin spacing, and 166 psf when tested on 5-foot purlin spacing.

1.5 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two-year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty-year limited warranty on paint finish for adhesion to the substrate and a thirty-year limited warranty on chalk and color fade.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span or approved equal.

2.2 MATERIALS

- A. Metal Wall Panels: AEP Super-Span, or approved equal.

1. Prefinished Galvalume® or Zinalume® sheet, ASTM AZ50 made of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792.
 2. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 3. Fabricated panel with integral continuous overlapping seams.
 4. Seam Height: 1-1/4" high.
 5. Provide pre-installed, high grade, hot-melt elastomeric sealant or butyl mastic, within the confines of panel's female leg, designed to seal against adjacent male panel leg.
 6. Thickness: 24 gauge (0.0250 inch).
- B. Panel Finish:
1. Exterior Finish: One coat 70 percent polyvinylidene fluoride, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer. Color as indicated on Drawings.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Fasteners and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
1. Overall rake to rake tolerances plus or minus 2 inches or plus or minus 1 inch at each rake.
 2. Vertical deviation from the nominal wall plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length and plus or minus 1/2 inch over the entire wall area.
- C. Verify wall openings, curbs, pipes, sleeves, ducts, or vents through wall are solidly set, reglets are in place, and nailing strips located.

- D. Correct defective conditions before beginning Work.
- E. If substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- D. Install flashing and trim true and in proper alignment.
- E. Protective film on trim shall be removed before exposure to sunlight.
- F. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight

3.3 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 43 13
FORMED VENTED SOFFIT PANELS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal Soffit panels.
- B. Flashing and trim integral to wall panels.
- C. Fasteners and accessories for installation of panel system.

1.2 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures.
- B. Section 01 45 00 - Quality Control.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Product Literature for each material used.
 - 2. Manufacturer's surface preparation and installation instructions.

1.4 REFERENCE STANDARDS

- A. UL 580 – Uplift Resistance of Roof Assemblies.
- B. UL 1897 – Uplift Test for Roof Covering Systems.
- C. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM A 792 – Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process.
- E. ASTM A 924 – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

1.5 PERFORMANCE REQUIREMENTS

- A. Structural and Wind Load Tests:
 - 1. Design load/deflection criteria verified from tests per ASTM E 72 "Chamber Method" using a 20 psf (0.96 kPa) simulated wind load with a deflection limit of L/240.
 - 2. FM Approval Standard 4471: Meets windstorm Class 1A [90] and hailstorm Class 1-SH classifications.
 - 3. Underwriters Laboratory (UL) Uplift Tests for Roof Assemblies: UL Class 90 rated in accordance with UL 580 and shall withstand static uplift load of 140 psf when tested on 7-foot purlin spacing and 166 psf when tested on 5-foot purlin spacing.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's two-year limited warranty that panels are free from defects in materials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty. Warranty does not include interior painted surface of panels.
- B. Submit exterior paint manufacturer's written twenty-year limited warranty on paint finish for adhesion to the substrate, and a thirty-year limited warranty on chalk and color fade.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: AEP Span or approved equal.

2.2 MATERIALS

- A. Metal Wall Panels: AEP Vented Flush-Panel or approved equal.
1. Prefinished Galvalume® or Zinalume® sheet, ASTM AZ50 made of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792.
 2. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 3. 1" Standoff from Substrate.
 4. Thickness: 24 gauge (0.0250 inch).
 5. Two pencil ribs.
 6. Provide 7.8% Net Free Area.
 7. Concealed Fasteners.
 8. 12" Net Coverage.
- B. Panel Finish:
1. Exterior Finish: One coat 70 percent polyvinylidene fluoride, nominal 0.7 mil (0.02 mm) thick, over 0.2 mil (0.005 mm) primer. Color as indicated on Drawings.
- C. Flashing and Trim: Brake-formed sheet metal in the same thickness and finish to match the panels.
- D. Fasteners: Fasteners and accessories for installation of panel system as recommended by panel manufacturer for the system specified.
- E. Sealant: Sealant as recommended by panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine structural members before beginning installation to ensure that all supporting members are straight, level, plumb and satisfactory for panel installation.
- B. Panel Support Tolerances:
 - 1. Overall rake to rake tolerances plus or minus 2 inches, or plus or minus 1 inch at each rake.
 - 2. Vertical deviation from the nominal wall plane of plus or minus 1/8 inch in any 5 foot length, plus or minus 1/4 inch in any 20 foot length, and plus or minus 1/2 inch over the entire wall area.
- C. Verify wall openings, curbs, pipes, sleeves, ducts, or vents through wall are solidly set, reglets are in place, and nailing strips located.
- D. Correct defective conditions before beginning work.
- E. If substrate is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions and recommendations including approved shop drawings, installation guidebook and manufacturer's handbook of construction details.
- B. Anchor securely in place using fasteners spaced in accordance with manufacturer's recommendations for design wind load criteria.
- C. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.
- D. Install flashing and trim true and in proper alignment.
- E. Protective film on trim shall be removed before exposure to sunlight.
- F. Install sealants where indicated to clean dry surfaces only without skips or voids, to ensure weather tight.

3.3 CLEANING

- A. Replace damaged panels and other components of work, which cannot be repaired by finish touch-up or similar minor repair.
- B. Wipe finished surfaces clean of any filings caused by drilling or cutting to prevent rust staining.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 07 92 00
JOINT SEALANT

PART 1 – GENERAL

1.1 SECTION INCLUDES

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

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 equal, meeting Fed. Spec. TT-S-00230C, Type II, Class A.
- B. Color shall be gray except where installed against white painted 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.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

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 specified in the Drawings, see Section 09 97 13.23 – Exterior Steel Coatings.

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

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SECTION 09 97 13.23
EXTERIOR STEEL COATINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This section includes surface preparation and external coating requirements for coating touch up to be completed in the field after shop fabrication and field erection.

1.2 RELATED REQUIREMENT

- A. Section 07 92 00 – Joint Sealant.

1.3 GENERAL REQUIREMENTS

- A. Unless specified herein, the coating manufacturer's printed recommendations and instructions for shelf life, storing, surface preparation, mixing, thinning, handling, applying, curing, ambient conditions during application and curing, and for all other procedures relative to coating shall be strictly observed.
- B. It is the applicator's responsibility to perform work to the requirements of this Specification, and to conduct inspections and tests necessary to ensure compliance.

1.4 COATING SYSTEMS

- A. Coating systems shall be as specified in Drawings.

PART 2 – PRODUCTS

2.1 COATING SYSTEM TOUCH UP

- A. Provide the same products for touch up as the Coating Systems specified in the Drawings.

PART 3 – EXECUTION

3.1 GENERAL

- A. Out-dated or coatings exceeding the "pot life" of coatings as specified by the coating manufacturer shall not be used.

3.2 SAFETY

- A. It is the responsibility of the Contractor and any subcontractors to perform all Work in a safe manner. Also, it is the responsibility of the Contractor to assure that all applicable health and safety standards and all local, state, and federal safety regulations are met. The omission in this Specification of any applicable safety regulation does not relieve the Contractor of responsibility to comply.
- B. The Contractor shall keep on hand at the worksite copies of all local, state, and federal safety regulations governing the work procedures and copies of the Safety Data Sheets (SDS) for all chemicals at the work site. The Contractor shall brief all workers at the job site of the location of the regulations and SDS.
- C. Provide safe access to the work areas. The work area shall be kept free of debris.
- D. Any ignition source, such as internal combustion engines, welding operations, smoking areas, shall be kept at a safe distance from surfaces during coating application and curing.
- E. Blast nozzles shall be equipped with a "deadman" type shut-off device. Blasting hoses, spray equipment, air movers, and other type equipment shall be grounded.
- F. Inspect protective clothing and personal protective equipment before use to ensure they are in proper, functioning condition.
- G. It is the Contractor's responsibility to dispose of all materials, both hazardous and non-hazardous. All unused mixed materials shall be disposed of immediately. All cans containing coating materials or thinners, or that were used for mixing materials, and all rags or other items contaminated with coating materials or thinners shall be disposed of according to applicable safety and waste disposal regulations.
- H. Any proposed deviations from this Specification must be brought to the attention of the Engineer prior to implementation of change.

3.3 REPAIR OF DAMAGED COATINGS

- A. Visually inspect surfaces for any damage to coatings. Repair any damaged areas by grinding down to bare metal, feathering, and roughening the surrounding coating. Allow coating to cure. Measure the DFT and correct as necessary.
- B. The primer coating should be applied to the damaged area with a minimum 6-inch radial overlap to the existing coating.

- C. After the coating has cured and before reaching the recoat window, based on climatic conditions and manufacturer's product literature, apply intermediate coat and top coat as specified 6-inches and 12-inches beyond the repair area respectively.

END OF SECTION

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DIVISIONS 10 – 20

(NOT USED)

SECTION 21 13 29.10

FIRE SUPPRESSION

Notes:

- 1) *All paragraphs below shown in light italic text reference work that was performed as part of the prior module assembly contract and are included here for reference only. ATS Alaska was the subcontractor responsible for installation and certification of the module fire suppression system under the module assembly contract.*
- 2) *All paragraphs below shown in standard text are to be performed under this contract.*

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. *The work involves design, installation, testing, and certification of an automatic fire suppression system for two power generation modules. The modules will each contain three diesel engine generators as indicated.*
- B. *The modules will be completely assembled off-site (shop fabricated), not field constructed in the communities of Clark's Point and Port Heiden. All fire suppression system installation, and the initial testing will occur off site and 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. *Acceptance testing and certification of completed system.*
 6. *Preliminary operation training with Authority staff.*
 7. *Preparation for shipping.*
 8. *Operation and Maintenance Manuals including as-built drawings.*
- C. *Upon acceptance of shop fabrication installation and testing by the Authority, one module will be shipped to Clark's Point, Alaska, and one module will be shipped to Port Heiden, Alaska, for permanent installation and commissioning under a separate on-site contract. All final system testing, certification, commissioning, and training will occur on-site in these communities and will include but not be limited to:*
 1. *Filling and charging system.*

2. *Final acceptance testing and certification of completed system.*
3. *Minimum four hours operation training with local operators and Authority staff.*

1.2 RELATED SECTIONS

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

1.3 QUALITY ASSURANCE

- A. *All equipment shall be new and 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. *Agent piping layout including size and quantity of nozzles.*
 4. *Calculations.*
 5. *Shop drawings shall indicate compliance with all requirements of the specifications and shall contain at a minimum:*
 - a. *Floor Plans and Isometrics for agent piping.*
 - b. *Floor Plans and Diagrams for Wiring complete with circuit designation in accordance with Wire Schedule on the Drawings (A-B-C-D-E).*
 - c. *Panel and device installation details.*
 - d. *Bill of Materials*
 - e. *Installation notes and system Sequence of Operation.*
- C. *Based upon review comments by the Authority issue final revised submittal including final construction drawings.*
- D. *Submit a copy of State of Alaska, Fire Marshal Plan Review Permit to the Authority.*
- E. *Prior to testing, certification, and training provide Operation and Maintenance Manuals. Manuals to include system description, manufacturer's catalog information, programming, instructions, operations and maintenance literature, Material Safety Data Sheets (MSDS) for extinguishing agent, and as-built drawings of completed system. Deliverables to include one bound copy plus 4 CD's with PDF format electronic files 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. *Wall or 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, hardware, and backbox for panel surface mount installation.*
- 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, gelled electrolyte batteries. The batteries shall be completely maintenance free. Fluid level checks and refilling shall not be required.*

- 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, electro-optical, automatic calibrating, digital fire detectors. Fire Sentry Corporation Model SS4-A2 or approved equal. Install on SM4 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 WGEC24-75WR or approved equal.*

2.9 MANUAL PULL STATION

- A. *Manual pull station(s) shall be UL Listed, addressable, double action, and provide visible indication that station has been operated. Fike 02-3710 or approved equal.*

2.10 ABORT STATION

- A. *UL Listed, mushroom button abort station. Station coloring to be highly visible. Label or provide placard. Fike 10-1639 or approved equal.*

2.11 DEVICE MONITORING MODULES

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

2.12 PLACARDS

- A. *Provide placards in compliance with NFPA as required. Provide additional warning placards as indicated on the plan in accordance with the Placard Schedule.*

2.13 RACEWAYS AND CONDUCTORS

- A. *Route all wiring in separate dedicated raceways for all fire suppression system wiring at no cost to Contractor. 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 and color as indicated by service in accordance with the following schedule:*

120V AC Power - 12 AWG, stranded, color per station service scheme.

24V DC Power, Detection, and Alarm Circuits - 14 AWG, color in accordance with the Wire Schedule.

2.14 NOZZLES

- A. *In Total Flooding and Local Application zones nozzles shall be open spray head type, Marioff 4S IMC 8MB 1000 or approved equal.*

2.15 PIPING

- A. *Contractor shall furnish, install, and pressure test agent discharge tubing/piping in accordance with manufacturer's recommendations.*

2.16 SUPPORT

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

2.17 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. *Design fire suppression system with two zones of coverage as shown on the Drawings.*
 - 1. *Zone 1 (Generation Room) shall contain agent rack, discharge piping and nozzles. Two flame detectors shall be cross-zoned so that any one detector will set off alarm and shut-down generators. Any second detector will begin a 30 second countdown to agent release. Two high temperature heat detectors shall be cross-zoned in the same sequence as the flame detectors. Exit shall have a manual "Agent Release" pull station which will begin a 30 second countdown to agent release when activated.*
 - 2. *Zone 2 (Control Room) shall contain the control panel, one smoke detector and one normal temperature heat detector. Either detector will set off alarm and will shut-down generators. Exit shall have a manual "Agent Release" pull station which will begin a 30 second countdown to agent release when activated. An abort station shall be located near the control panel. In the event of a false alarm, pressing and holding the abort button will stop the 30 second countdown to release, and silence audible alarms. Once released, audible alarms will resume and 30 second countdown will restart. The abort will not function in the event of a Manual Agent Release.*
- B. *Provide annunciators and other devices where specifically indicated on the Drawings.*

3.2 INSTALLATION - GENERAL

- A. *The system shall be installed in accordance with the Contract Documents, 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 INSTALLATION – SHOP MODULE ASSEMBLY

- A. *Upon completion of shop testing, all water shall be drained and/or blown out of the system to prevent freeze damage and the batteries shall be disconnected.*
- B. *Each system shall be left with one fully charged nitrogen cylinder installed in the rack plus one fully charged spare nitrogen cylinder shipped loose with the module.*

3.4 INSTALLATION – ON SITE

- A. The final testing and commissioning will occur on site and will include but not be limited to:
 - 1. Filling and charging systems.
 - 2. Final acceptance testing and certification of completed systems.
 - 3. Minimum four hours operation training at each site with local operators and Authority staff.
 - 4. Verify that each system has one fully charged nitrogen cylinder installed in the rack plus one fully charged spare nitrogen cylinder.

END OF SECTION

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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. Section includes:
 - 1. General mechanical work.
 - 2. Painting and marking.
 - 3. Valve tags, signs, and placards.
 - 4. Flashing and sealing.

1.2 RELATED SECTIONS

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

1.3 PROJECT RECORD DRAWINGS

- A. In addition to other requirements of Division 1, mark up a clean set of drawings as the work progresses to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing of work in concealed blind spaces within the building.

- B. Provide one set of drawings clearly marked up with all as-built information to the Authority within two weeks of completion.

- C. At completion of project, deliver these drawings to the Authority and obtain a written receipt.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described in Division 23 Specifications and shown on the Drawings to demonstrate compliance with the requirements of the project. Provide submittals in the manner described herein and in Division 1.
- B. Painting and Marking: Submit manufacturers catalog literature for each product required.
- C. Valve Tags: Submit manufacturers catalog literature for tags as indicated on the Schedule on Sheet M1.2.
- D. Signs and Placards: Submit manufacturers catalog literature as indicated on the Schedule on Sheet M1.2.
- E. Equipment: Submit manufacturers catalog literature for each item indicated on the Mechanical Schedules under the Division 23 Sections that follow. See specific requirements under each section.

1.5 RECEIVING AND HANDLING

- A. See general conditions and the general requirements in Division 1 regarding material handling.
- B. Deliver packaged materials to the jobsite in unbroken packaging with manufacturer's label, and store to facilitate inspection and installation sequence.
- C. Protect all materials and equipment during the duration of construction work against contamination and damage. Replace or repair to original manufactured condition any items damaged during construction. Immediately report any items found damaged to the Authority prior to commencing construction.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Division 1 – Material and Equipment: Storage and protection.

1.7 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform all work in accordance with the latest adopted editions of the International Fire Code, the International Building Code, and the International Mechanical Code including State of Alaska amendments. Comply with all applicable State and Federal regulations.

- C. Perform work with skilled craftsman specializing in said work. Install all materials in a neat and orderly, and secure fashion as required by Specifications and commonly recognized standards of good workmanship.

1.8 SCHEDULE OF WORK

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

1.9 COOPERATION AND CLEANING UP

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

1.10 SPECIAL CONDITIONS

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

1.11 WARRANTY

- A. Division 0 – Quality Assurance.
- B. Division 1 – Contract Closeout.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide all equipment and materials required for a complete system.
- B. All equipment and materials supplied under this Contract are new unless specifically indicated as existing. Where additional or replacement items are required, provide like items by the same manufacturer to the maximum extent practical.
- C. Install all material and equipment in accordance with manufacturer's installation instructions and recommendations unless specifically indicated otherwise.

2.2 PAINTING

- A. Carbon Steel Pipe – Paint all new and modified carbon steel fuel pipe. Wire brush and wipe down with solvent. Prime and finish with two coats of direct to metal alkyd enamel, Sherwin Williams DTM or approved equal, color Structural Gray 4031.
- B. Carbon Steel Supports – Paint all new and modified carbon steel fabrications and supports equivalent to fuel pipe.
- C. Touch-Up of Painted Items – Touch up paint on previously coated items to match original.
- D. Touch-Up of Galvanized Items – Finish all cut ends and damaged surfaces of galvanized and zinc plated supports and fasteners with spray on Cold Galvanizing Compound, ZRC or approved equal. Wire brush, wipe down with solvent, and apply two coats.

2.3 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 schedule.
- C. Install all tags as noted.

2.4 SIGNS AND PLACARDS

- A. Provide decals and sign boards, color coded and worded as indicated on the Schedule on Sheet M1.2. Install as noted.

2.5 PIPE MARKING

- A. Install flow arrows on heat recovery piping. Black or white arrows over colored backgrounds, self-adhesive vinyl, Seton arrows on roll or approved equal. Background color scheme to match the Specific Function Valve Tags.

2.6 FLASHING AND SEALING

- A. Caps & Coverings: Steel, 16 gauge minimum.
- B. For penetration of all interior wall penetrations seal with polyurethane caulking.
- C. For piping smaller than 2" through exterior walls seal with polyurethane caulking unless noted otherwise.
- D. For piping 2" and larger through exterior walls install flashing as indicated on Drawings. Best Materials Multi-Flash Master Flash or approved equal, Black EPDM. Note that the retro-fit style may be used for convenience.

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 to field verify all dimensions and conditions prior to start of construction. Immediately contact the Authority for clarification of questionable items or apparent conflicts.

3.2 CUTTING, FITTING, REPAIRING, PATCHING, AND FINISHING

- A. Where previously completed building surfaces or other features must be cut, penetrated, or otherwise altered, such work shall be carefully laid out and patched to the original condition. Perform work only with craftsmen skilled in their respective trades.
- B. Do not cut, drill, or notch structural members unless specifically approved by the Authority. Minimize penetrations and disruption of building features.
- C. Seal all exterior ceiling and wall penetrations as indicated. Where exterior wall penetrations are accessible from the inside seal both interior and exterior surfaces as indicated.

3.3 EXAMINATION

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

3.4 INSTALLATION OF EQUIPMENT

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

3.5 SCOPE OF ISOLATION AND RESTRAINT WORK

- A. All vibrating equipment and the interconnecting pipe and ductwork shall be isolated to eliminate the transmission of objectionable noise and vibration from the structure.
- B. Mechanical equipment shall be carefully checked upon delivery for proper mechanical performance, which shall include proper noise and vibration operation.
- C. All installed rotating equipment with excessive noise and/or vibration, which cannot be corrected in place, shall be replaced at no cost to the Authority.

END OF SECTION

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SECTION 23 05 29
HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Pipe hangers and supports.
 - 2. Hanger rods.
 - 3. Formed steel channel.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for Mechanical.
- B. Section 23 11 13 – Fuel and Lube Oil Piping.
- C. Section 23 21 13 – Hydronic Piping.
- D. Section 23 35 16.10 – Engine Exhaust and Crank Vent Piping.
- 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 E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 2. ASTM E814 – Standard Test Method for Fire Tests of Through Penetration Fire Stops.
 - 3. ASTM F708 – Standard Practice for Design and Installation of Rigid Pipe Hangers.
 - 4. ASTM E1966 – Standard Test Method for Fire-Resistive Joint Systems.

- C. American Welding Society:
 - 1. AWS D1.1 – Structural Welding Code - Steel.
- D. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.
 - 2. MSS SP 69 – Pipe Hangers and Supports - Selection and Application.
 - 3. MSS SP 89 – Pipe Hangers and Supports - Fabrication and Installation Practices.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data: Hangers and Supports: Submit manufacturers catalog data including load capacity. Indicate finish for interior and exterior applications.
- C. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

1.5 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Conform to applicable code for support of hydronic piping.
- C. Perform Work in accordance with State of Alaska Standards.

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, interior installations pre-galvanized finish, exterior installations hot dip galvanized finish, 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 (HDG) or approved equal.
- C. Double Strut: 12 gauge thick steel, 1-5/8" x 3-1/4", B-line B22A-SH-HDG or approved equal.
- D. On all exterior installations provide hot dip galvanized strut and fittings.

2.4 FITTINGS AND ACCESSORIES

- 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. Pipe Clamps: Two piece pipe clamp designed to support pipe tight to strut, B-line B20##, or approved equal, as indicated on the Pipe/Tubing Strut Clamp Schedule on Sheet M1.1. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- C. Pipe Straps: Two-hole steel pipe strap. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- D. Hanger Rods: Continuous threaded rod. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- E. Fasteners: All bolts, nuts, and washers to be zinc plated carbon steel except on exterior installations provide hot dip galvanized or stainless steel.

2.5 EARTHQUAKE ANCHORAGE

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

3.2 PREPARATION

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

3.3 INSTALLATION – PIPE HANGERS AND SUPPORTS

- A. Support piping and equipment as shown on Drawings using specified supports and fasteners. If not detailed on Drawings, support from structural members with pipe hangers, clamps or pipe straps specifically intended for the application.
- B. Independently support pumps and equipment. Supporting piping from connections to equipment shall not be permitted.
- C. Support horizontal piping as scheduled.
- D. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- E. Place hangers within 12 inches of each horizontal elbow or as indicated.
- F. Use hangers with 1-1/2 inch minimum vertical adjustment.
- G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation.
- K. For specific piping and equipment support details reference Drawings.

3.4 INSTALLATION – FLASHING

- A. Seal and flash all wall penetrations as indicated.

3.5 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

3.6 SCHEDULES

A. Copper Tube and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	Copper Tube Maximum Hanger Spacing (Ft)	Steel Pipe Maximum Hanger Spacing (Ft)	Copper Tube Hanger Rod Diameter (In)	Steel Pipe Hanger Rod Diameter (In)
1/2 & 3/4	5	7	3/8	3/8
1 & 1-1/4"	6	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
3	10	10	1/2	1/2
4	12	10	1/2	5/8

END OF SECTION

SECTION 23 09 00
INSTRUMENTATION AND CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Instrumentation Equipment.
 - 2. Pressure gauges.
 - 3. Thermometers.
 - 4. Thermometer thermowell.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 3. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
 - 4. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.
- B. ASTM International:
 - 1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 2. ASTM A536 - Standard Specification for Ductile Iron Castings.
 - 3. ASTM B32 - Standard Specification for Solder Metal.
 - 4. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 - 5. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

6. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing.
 7. ASTM E1 - Standard Specification for ASTM Thermometers.
 8. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.
- C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
- D. National Fire Protection Association:
1. NFPA 72 - National Fire Alarm Code.
 2. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Note that related Electrical Instrumentation devices are specified under Division 26 and are not included in this section.

1.5 CLOSEOUT

- A. Division 1 – Contract Closeout.
- B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.

1.6 QUALIFICATIONS

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept controls on site in original factory packaging. Inspect for damage.

1.8 COORDINATION

- A. Coordinate installation of control components in work of 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 0-100 psi: Trerice Model 700SS-25-02-L-A-110 or approved equal.

2.2 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Check equipment for damage that may have occurred during shipment. Repair damaged equipment as required or replace with new equipment.
- B. Verify location of thermostats and other exposed control sensors with Drawings before installation.
- C. Verify building systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Install instrumentation where indicated on the Drawings in accordance with manufacturer's installation instructions.
- B. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

- C. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate.
- D. Isolate hydronic pressure gauges during pressure testing.
- E. After completion of installation, test and calibrate all instrumentation.

END OF SECTION

SECTION 23 11 13
FUEL AND LUBE OIL PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all diesel fuel and lube oil (oil) piping systems.
- B. Section includes:
 - 1. Fuel oil piping.
 - 2. Unions and flanges.
 - 3. Valves and strainers.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 12 13 - Fuel and Lube Oil Equipment and Specialties.

1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working-Pressure Rating: Unless otherwise indicated, minimum pressure requirement for fuel and lube oil piping is 150 psig.

1.4 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.1 – Power Piping.
 - 2. ASME B31.9 – Building Services Piping.
 - 3. ASME B16.5 – Flanges and Flanged Fittings.
 - 4. ASME B16.9 – Factory-Made Wrought Steel Butt Welding Fittings.
 - 5. ASME B16.11 – Forged Fittings, Socket-Welding and Threaded.
 - 6. ASME Section IX – Boiler and Pressure Vessel Code – Welding and Brazing Qualifications.

- B. ASTM International:
 - 1. ASTM A106B – Standard Specification for Seamless Carbon Steel Pipe for High Temperature Services.
 - 2. ASME B16.11 Forged Fittings, Socket-Welding and Threaded.
- C. Underwriters Laboratories Inc.: UL 142 – Steel Aboveground Tanks for Flammable and Combustible Liquids.

1.5 SYSTEM DESCRIPTION

- A. Provide piping of material as specified in PART 2.
- B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded connections to valves, equipment.
- C. Provide pipe hangers and supports as per Drawings and Specifications.

1.6 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit manufacturer's catalog information for pipe materials, fittings, and accessories.
 - 2. Valves and Strainers: Submit manufacturer's catalog information with data and ratings for each service.
- C. Welders' Certificate: Include welders' certification of compliance in accordance with Quality Assurance below.

1.7 CLOSEOUT

- A. Division 1 – Contract Closeout.

1.8 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

- C. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.
- D. Perform pipe welding with experienced welder with current API or equivalent certification for pipe welding in all positions.

1.9 QUALIFICATIONS

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

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall be new unless otherwise specified. All items of the same type shall be of the same manufacturer.
- 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 1-1/2 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 1-1/2 inches in diameter unless indicated otherwise.
- D. Vent piping shall be galvanized with threaded joints.

2.2 PIPE

- A. Oil Pipe: 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 A235 seamless carbon steel butt weld fittings for all pipe 1-1/2 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 1-1/2 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 or approved equal. Coat with anti-seize prior to assembly.
- D. Flange Bolts: On all exterior piping provide stainless steel bolts, nuts, and washers. Coat with anti-seize prior to assembly.
- E. Vent pipe shall have threaded joints with minimum 300# galvanized threaded fittings.

2.4 BALL VALVES

- A. Flanged Ball Valves: Reduced port, carbon steel uni-body, ANSI 150# raised face flanged ends, stainless steel ball and trim, TFM seat and PTFE seals for NACE MR0175 service, lockable handle, 150 psig minimum working pressure. PBV C-5410-31-2236-FTNL or approved equal. Note that for a substitute valve to be approved it must be a domestic manufactured high quality industrial valve such as Apollo or Nibco.
- B. Threaded Ball Valves: Carbon steel body, threaded ends, stainless steel ball and trim, PTFE seat and Graphite/PTFE seals for NACE MR0175 service, lockable handle, 150 PSIG minimum working pressure. PBV C-5312-38-2236-TL-NC, PBV C-5322-38-2236-TL-NC or approved equal. Note that for a substitute valve to be approved it must be a domestic manufactured high quality industrial valve such as Apollo or Nibco.

2.5 CHECK VALVES

- A. Flanged Check Valves: Carbon steel body, ANSI Class 150 lb. raised face flanged ends, swing check valve suitable for the service conditions. Crane Class 150 No. 147 or approved equal.
- B. Threaded Check Valves: Brass body, threaded ends, swing check style, 150 psig minimum working pressure. Domestic only. Hammond, Milwaukee, Nibco, 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 – PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Drawings and Section 23 05 29.

3.4 INSTALLATION - PIPING

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Install valves with stems upright or horizontal, not inverted. Provide access where valves are not exposed.

- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- F. Prepare and paint pipe, fittings, supports, and accessories not pre-finished in accordance with Section 23 05 00.
- G. Install identification on piping systems in accordance with Section 23 05 00.

3.5 TESTING

- A. Division 1 – Quality Control.
- B. Test all oil piping with minimum 125 psig air. Test 100% of welds visually for leaks with each joint soaked in a foaming soapy water solution, and visually inspect each joint for leaks. Isolate and pressure test each run of piping for a minimum of one hour. Provide blind flanges, threaded caps or plugs at each end of the test section as needed. Do not conceal pipe joints before pressure testing is complete. Isolate equipment and components rated for lesser pressures so as not to damage these.
- C. Pressure test piping system again after all equipment is installed at 50 psi for a minimum of one hour, or the maximum rated pressure of the weakest component, whichever is less.
- D. Submit written procedures for testing, including test pressures, equipment to be used and items to be tested.
- E. Notify the Authority in writing seven (7) days in advance of pressure tests. The Authority shall be present at all testing. Pressure testing performed without the Authority present will be rejected, unless prior written approval is received from the Authority.
- F. Cut out, re-weld and re-test all leaking welded joints. Repair any leakage found and retest until system proves leak-free. Retesting after the repair of defects shall be performed at no cost to the Authority.
- G. Certified test results shall be submitted to the Authority for approval. Test certification shall include gauge pressure, air temperature, time, date, witness, and pipeline identification.

3.6 SYSTEM STARTUP

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

END OF SECTION

SECTION 23 12 13
FUEL AND LUBE OIL EQUIPMENT AND SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope: This section applies to all fuel and lube oil (oil) piping systems.
- B. Section Includes:
 - 1. Fuel Oil System Equipment.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 – Hangers and Supports for Piping and Equipment.
- C. Section 23 11 13 – Fuel and Lube Oil Piping.
- D. Division 26 – Electrical.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturer's catalog literature for each item indicated on the Fuel System Equipment Schedule on Sheet M1.5 (Port Heiden) and M1.4 (Clark's Point).

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 actuated ball valves, pipeline filter and fill limiter as indicated on the Fuel System Equipment Schedules on Sheet M1.5 (Port Heiden) and M1.4 (Clark's Point).

2.2 QUICK-CONNECT HOSE COUPLING

- A. Aluminum body cam and groove fitting with dust cap. Male fitting with ANSI 150# flanged, MPT or FPT connection, as specified, 150 PSIG minimum working pressure. PT coupling or 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 INSTALLATION

- A. Install equipment in accordance with Drawings and manufacturer's installation instructions.
- B. Electrical installation shall be in accordance with Division 26 Specifications.

3.4 SYSTEM STARTUP

- A. Prior to starting fuel and oil pumps, prime cavities with lube oil then energize momentarily to verify proper rotation.
- B. Fuel Piping: Prime all piping, fill filters with diesel fuel, and bleed off air prior to starting pumps.
- C. Verify operation of all day tank and blender controls including timers and level alarms.

END OF SECTION

SECTION 23 21 13
HYDRONIC PIPING

Notes:

- 1) All paragraphs below shown in light italic text reference work that was performed as part of the prior module assembly contract and are included here for reference only.*
- 2) All paragraphs below shown in standard text are to be performed under this contract.*

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. Unions and flanges.
 4. Valves and strainers.
 5. Engine coolant (ethylene glycol).
 6. Heat recovery fluid (propylene glycol).

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 - Hangers and Supports for Piping and Equipment.
- C. Section 23 21 16 - Hydronic Equipment and Specialties.
- D. Section 33 61 13 - Underground Hydronic Energy Distribution.

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 1. ASME B16.3 - Malleable Iron Threaded Fittings.
 2. ASME B16.4 - Gray Iron Threaded Fittings.
 3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

4. ASME B31.1 - Power Piping.
 5. ASME B31.9 - Building Services Piping.
 6. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International:
1. ASTM A53B - Standard Specification for Pipe, Steel, Black and Hot-Dipped.
 2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
- C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

1.4 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints.
- B. Provide flanges, unions, and couplings at locations requiring servicing. Use unions, flanges, and couplings downstream of valves and at equipment connections.
- C. Provide pipe hangers and supports in accordance with Drawings and Specifications.
- D. Use ball valves or butterfly valves for shut-off and to isolate equipment where indicated.
- E. Use gauge cock isolation valves to isolate instrumentation and small devices where indicated.
- F. Use hose end drain valves with cap for drains where indicated.
- G. Flexible Connectors: Use flexible connectors and hoses where indicated.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit manufacturer's catalog information for pipe materials, fittings, and accessories.
 - 2. Valves and strainers: Submit manufacturer's catalog information with data and ratings for each service.

1.6 CLOSEOUT

- A. Division 1 – Contract Closeout.

1.7 QUALITY ASSURANCE

- A. Division 1 – Quality Control.
- B. Perform Work in accordance with ASME B31.1 and ASME B31.9 code for installation of piping systems.
- C. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.8 QUALIFICATIONS

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

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 – PRODUCTS

2.1 PIPING

- A. Provide copper tube mains and branch piping as indicated on Drawings.
 - 1. Copper Tubing: ASTM B88, Type L drawn.
 - 2. Fittings: ASME B16.22 solder wrought copper.
 - 3. Joints: Soldered with 95-5 tin-antimony solder or silver solder except on tee drill connections use copper brazing rod.

2.2 UNIONS AND FLANGES

- A. Unions:
 - 1. Copper Piping: Bronze unions with solder ends except where specifically indicated as fitting unions provide solder by NPT bronze unions.
- B. Flanges:
 - 1. Copper Piping: Class 150, bronze companion flanges for transition to steel piping or flanged valves and equipment.
 - 2. Flange Gaskets: Full faced 1/8" thick nitrile rubber, Alaska Rubber or approved equal.
 - 3. Flange Bolts: On all exterior piping provide stainless steel bolts, nuts, and washers. Coat with anti-seize prior to assembly.

2.3 BUTTERFLY VALVES

- A. Lug style ductile or cast-iron body, ANSI 150# flange pattern ends, stainless steel stem with bronze bushing, bronze disc, EPDM seats, locking handle. Milwaukee ML-233E, Bray Series 31, 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.

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.

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 ENGINE COOLANT (ETHYLENE GLYCOL)

(Note: Glycol under this paragraph, including spare, was furnished as part of the module assembly contract and is included here for reference.)

- A. *Glycol Solution for Engine Cooling Service: The glycol shall be extended life (heavy duty) ethylene glycol, Shell Rotella 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, no exceptions.*
- C. *The solution shall be packaged in sealed 55-gallon drums and labeled "Ethylene Glycol" with pink lettering.*

2.10 HEAT RECOVERY FLUID (PROPYLENE GLYCOL)

- A. Glycol Solution for Heat Recovery Service: The glycol shall be extended life (heavy duty) propylene glycol, Safe-T-Therm HD, Dowfrost HD, or approved equal. Note that standard life propylene glycol will not be accepted.

- B. The solution shall be premixed to a ratio of 50% propylene glycol to 50% water. The water shall be treated in accordance with glycol manufacturer's recommendations. The mixed solution shall be dyed bright orange, no exceptions.
- C. The solution shall be packaged in sealed 55-gallon drums and labeled "Propylene Glycol" with orange lettering.

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.

3.3 INSTALLATION – PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION – PIPING SYSTEMS

- A. Route piping in orderly manner and slope to drain at low points and vent at high points.
- B. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.
- C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- D. Install valves with stems upright or horizontal, not inverted. Provide access where valves are not exposed.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- F. Install identification on piping systems in accordance with Section 23 05 00.

3.5 **COOLING SYSTEM SHOP TESTING AND FLUSHING**

(Note: Work under this paragraph was performed as part of the module assembly contract and is included here for reference.)

- A. *Install conical "witch hat" strainers on inlets to radiators. Orient "witch hat" to collect debris inside cone.*
- B. *Fill the entire system with potable water and 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. Isolate engines and radiators prior to pressure testing.*
- C. *Flush the entire system with potable water. Run engines briefly with limited load as required to obtain circulation through the entire system. To ensure engines are not damaged, do not run under high load or for extended periods of time with potable water.*
- D. *Drain system completely. Remove "witch hat" strainers.*

3.6 **COOLING SYSTEM SHOP FILLING AND CHARGING**

(Note: Work under this paragraph was performed as part of the module assembly contract and is included here for reference.)

- A. *After pressure testing and flushing, fill entire system with ethylene glycol solution. Perform all functional testing of the module 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. *Operate control room heating system to ensure it is fully charged with glycol.*
- C. *Verify proper function of all instrumentation and calibrate all devices.*
- D. *All excess glycol solution shall be left with the modules in the original drums and sealed for shipping with the module.*

3.7 HEAT RECOVERY SYSTEM SHOP TESTING AND FLUSHING

(Note: Work under this paragraph was performed as part of the module assembly contract and is included here for reference.)

- A. *Install temporary pipe or hose jumper between flanges where module heat recovery pipe terminates.*
- B. *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.*
- C. *Fill the entire system with potable water and flush thoroughly. Run pumps as required to obtain circulation through the entire system.*
- D. *Operate heat recovery system with engines under load and engine cooling system up to normal temperature. Verify proper function of all instrumentation and calibrate all devices.*
- E. *Upon completion of testing allow system to cool down to ambient temperature. Drain system completely. Blow out with air as required to ensure freeze protection.*

3.8 COOLING SYSTEM ON SITE FILLING AND TESTING

- A. Upon completion of on-site radiator piping installation, add ethylene glycol solution to the cooling system as required to top off and bring the level in the expansion tank to approximately 50%.
- B. Isolate engines and radiators prior to pressure testing and hydrostatically test coolant piping mains at 100 psig minimum for one hour with no noticeable water leaks or pressure drops except as caused by temperature change.
- C. After pressure testing, perform all functional testing of the module 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.
- D. Operate control room heating system to ensure it is fully charged with glycol.
- E. Verify proper function of all instrumentation and calibrate all devices.
- F. Transfer excess ethylene glycol solution into glycol storage tank until 95% full. Store any excess ethylene glycol solution with the modules in the original drums sealed for long-term storage.

3.9 HEAT RECOVERY SYSTEM ON SITE FILLING AND TESTING

- A. Upon completion of arctic pipe installation and prior to insulating and covering joints, pressure test all PEX crimp joints and steel weld joints. Pressurize arctic pipe with minimum 20 psig air, soak each joint with a foaming soapy water solution, and visually inspect each joint for leaks.
- B. After testing arctic pipe, isolate arctic pipe from piping in the end user buildings. Fill above grade piping and equipment in the end user buildings with potable water and 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.
- C. Flush above grade piping and equipment in the end user buildings system with potable water and drain or blow out with air to remove all water.
- D. After pressure testing and flushing, bleed air reservoir on the expansion tank in the module as required to maintain 10 psig residual with the system empty. Fill the entire heat recovery system including module piping, arctic pipe, and end user building piping with propylene glycol solution to 20 psig minimum with system cold. Vent air from all high point vents prior to starting circulating pumps.
- E. Cycle pumps on and off and vent high points until all air has been purged from the piping. Add propylene glycol solution as required to maintain 20 psig minimum with system cold. When the system comes up to normal temperature (170°F minimum) add propylene glycol solution as required to bring system pressure to 30 psig minimum at expansion tank.
- F. Verify proper function of all instrumentation and calibrate all devices.
- G. Perform complete functional testing of the heat recovery system including control devices and panels.
- H. Clean all piping strainers after the first 24 hours of operation. Clean strainers and bleed air at least one more time prior to leaving the project site.
- I. All excess propylene glycol solution shall be left with the modules in the original drums sealed for storage.

END OF SECTION

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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. Heat Recovery and End User Building Heating Equipment.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 05 29 – Hangers and Supports for Piping and Equipment.
- C. Section 23 21 13 – Hydronic Piping.
- D. Division 26 – Electrical.
- E. Section 33 61 13 – Underground Hydronic Energy Distribution.

1.3 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Submit manufacturers catalog literature including manufacturer's installation instructions for each item indicated on the Heat Recovery Equipment Schedule on Sheet M8.1.

1.4 CLOSEOUT

- A. Division 1 – Closeout Requirements.
- B. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.5 QUALIFICATIONS

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept material on site in shipping containers with labeling in place. Inspect for damage.
- B. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Division 1 – Material and Equipment: Storage and Protection.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements before fabrication.

PART 2 – PRODUCTS

2.1 HEAT RECOVERY SYSTEM EQUIPMENT

- A. Provide all equipment as indicated in the Heat Recovery Equipment Schedule on Sheet M8.1.

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.

3.2 INSTALLATION

- A. Install equipment and accessories in strict compliance with manufacturer's instructions.
- B. Install piping system and appurtenances as indicated on Drawings.

3.3 CLEANING

- A. Clean and flush glycol system before adding glycol solution. See Section 23 21 13 – Hydronic Piping.

END OF SECTION

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SECTION 23 31 13
METAL DUCTS AND VENTILATION EQUIPMENT

Notes:

All ventilation system fabrications were furnished and some items were installed as part of the prior module assembly contract. Installation of exterior exhaust hoods and the intake duct system as described below is to be performed under this contract.

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Exhaust Hoods & Intake Ducting Installation.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

- A. National Fire Protection Association: NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
- B. Sheet Metal and Air Conditioning Contractors: SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 NO SUBMITTALS REQUIRED THIS SECTION.

1.5 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.

1.6 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.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section.

1.8 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.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication as required.

PART 2 – NO PRODUCTS REQUIRED THIS SECTION.

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install intake ducting and exterior exhaust hoods as indicated on Drawings and in Ventilation System Shop/On-Site Notes, Sheet M7.1.
- B. Verify proper operation of fans and dampers.
- C. Install air filters provided with module in all intake ducts and deliver spare filters to utility.

END OF SECTION

SECTION 23 35 16.10
ENGINE EXHAUST AND CRANK VENT PIPING

Notes:

All exhaust and crank vent piping systems were furnished and partially installed as part of the prior module assembly contract. Installation of exhaust and crank vent piping through the module exterior wall as described below is to be performed under this contract.

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope: Re-installation of exhaust and crank vent piping, insulation, jacket and cover plates.
- B. Section includes:
 - 1. Flange Gaskets.

1.2 RELATED SECTION

- A. Section 23 05 00 – Common Work Requirements for Mechanical.

1.3 SYSTEM DESCRIPTION

- A. All fabrications and materials provided with module under assembly contract except as indicated below in Part 2 – Products.

1.4 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Gaskets: Submit manufacturer's catalog information with data and ratings for high temp exhaust service.
 - 2. Wall penetration insulation: Submit manufacturer's catalog information with data.

1.5 QUALITY ASSURANCE

- A. Division 1 – Quality Control.

1.6 QUALIFICATIONS

- A. Fabricator or Installer: Company specializing in performing Work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Division 1 – Material and Equipment: Transportation and Handling.
- B. Accept piping and materials on site in shipping containers with labeling in place. Inspect for damage.
- C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 – PRODUCTS

2.1 FLANGED JOINTS

- A. Flange Gaskets: High temperature, full face, for ANSI 150# type flange, Frenzelit Novatec 925°F or approved equal.

2.2 WALL PENETRATION INSULATION

- A. TYPE 1 mineral wool fiber batt insulation. Rockwool Safe-N-Sound 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 REINSTALLATION – PIPING

- A. See Exhaust and Crank Vent Shop/On-Site Notes, Sheet M6 for installation of exhaust piping, crank vent piping, insulation, jacketing and cover plates.
- B. Install all new flange gaskets.

- C. Coat all exhaust flange bolts with high temperature anti-seize.
- D. Re-tighten all exhaust flange bolts after minimum one engine run/cool cycle prior to applying insulation.

3.3 PIPE AND WALL PENETRATION INSULATION

- A. Reinstall pipe insulation and jacket as indicated.
- B. Fill entire wall penetration void with mineral wool insulation.
- C. Install cover plates and seal as indicated.

END OF SECTION

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SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Provide the labor, materials, equipment and test equipment necessary to furnish, install, and place into operation the power, motor, control, alarm, and associated electrical systems of this Contract. Connect motors, meters, panels, sensors, AND switches, or any other electrical device installed or provided as part of the project. Mark and identify circuits, terminal boards, equipment, enclosures, etc. with identification numbers, wire numbers, nameplates, and warning signs. Test, adjust and calibrate equipment and start-up all electrical equipment and its associated mechanical attachments as necessary to place the project into operation.
- B. Provide and install all control equipment and wiring to instruments and devices installed by others.
- C. Where the work of several crafts is involved, coordinate all related work to provide each system in complete and in proper operating order.
- D. Cooperate with all others involved in the project, with due regard to their work, to promote rapid completion.
- E. Local Conditions: The Contractor shall thoroughly familiarize himself with the work as well as the local conditions under which the work is to be performed. Schedule work with regard to seasons, weather, climate conditions, and all other local conditions which may affect the progress and quality of work.
- F. See Division 1 of which contain information and requirements that apply to work specified herein.
- G. The Contractor shall provide electrical service to, connection and/or interconnection of various units of equipment supplied by others.

1.2 RELATED REQUIREMENTS

- A. This section applies to all Division 26 work.
- B. See Divisions 1, 21, 23, 26, and 33 which contain information and requirements that apply to work specified herein.

1.3 TELEPHONE SERVICE

- A. Telephone service is not a part of this project.

1.4 CODES AND STANDARDS

- A. Codes: Perform all work in strict accordance with all applicable national, state, and local codes; including, but not limited to the latest legally enacted editions of the following specifically noted requirements:
 - 1. NFPA 70, National Electric Code - NEC;
 - 2. ANSI-C2, National Electrical Safety Code - NESC;
 - 3. International Building Code - IBC; and
 - 4. International Fire Code - IFC.
- B. Standards: Reference to the following standards infers that installation, equipment, and materials shall be within the limits for which it was designed, tested, and approved, in conformance with the current publications and standards of the following organizations:
 - 1. American National Standards Institute - ANSI;
 - 2. American Society for Testing and Materials - ASTM;
 - 3. American Society of Heating, Refrigerating and Air Conditioning Consultants - ASHRAE (Standard 90-75);
 - 4. Factory Mutual – FM;
 - 5. Institute of Electrical and Electronics Consultants - IEEE;
 - 6. National Electrical Contractors Association - NECA;
 - 7. National Electrical Manufacturers' Association - NEMA;
 - 8. National Fire Protection Association - NFPA, and
 - 9. Underwriters Laboratory - UL

1.5 SPECIFIC TERMINOLOGY

- A. Streamlining: In many instances, the products, reference standards, and other itemized specifications have been listed without verbiage. In these cases, it is implied that the Contractor shall provide the products and perform in accordance with the references listed.
- B. The word "Contractor" as used in Division 26 Specifications shall mean "Electrical Contractor."

- C. The word "General Contractor" as used in Division 26 Specifications shall mean the Contractor responsible for the project.
- D. "Furnish" means to purchase material as shown and specified, and cart the material to an approved location at the site or elsewhere as noted or agreed to be installed by supporting crafts.
- E. "Install" means to set in place and connect, ready for use and in complete and properly operating finished condition, material that has been furnished.
- F. "Provide" means furnish all products, labor, sub-contracts, and appurtenances required and install to a complete and properly operating, finished condition.
- G. "Rough-in and Connect" means provide an appropriate system connection such as conduit with "J" boxes, wiring, switches, disconnects, etc., and all wiring connections. Equipment furnished is received, uncrated, assembled and set in place under the Division in which it is specified.
- H. "Accessible" means arranged so that an appropriately dressed man 6-foot 2 inches tall, weighing 250 pounds, may approach the area in question with the tools and products necessary for the work intended, and may then position himself to properly perform the task to be accomplished, without disassembly or damage to the surrounding installation.
- I. "Serviceable" means arranged so that the component or product in question may be properly removed and replaced without disassembly, destruction, or damage to the surrounding installation.
- J. "Product" is a generic term which includes materials, equipment, fixtures, and any physical item used on the project.

1.6 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. The Drawings are partly diagrammatic and do not show precise routing of conduits or exact location of all products, and may not show in minute detail all features of the installation; however, provide all systems complete and in proper operating order.
- C. Drawing symbols used for basic materials, equipment and methods are commonly used by the industry and should be universally understood. Special items are identified by a supplementary list of graphical illustrations, or called for on the Drawings or in the Specifications.

1.7 SUBMITTALS, MANUALS AND SHOP DRAWINGS

- A. Furnish submittals in the manner described herein, and in Division 1.
- B. 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.
 - 1. Under this Section provide submittals for all equipment, devices, conductors, and instrumentation as indicated on the schedules on the Drawings.
 - 2. Under the Sections that follow provide submittals for all materials and equipment specified under that Section.
- C. Include data for review, and organize data, as noted below:
 - 1. Specific reference and/or drawings reference for which literature is submitted for review with an index, following specification format, and item by item identification.
 - 2. Manufacturer's name and address, and supplier's name, address, and phone number.
 - 3. Catalog designation or model number with rough-in data and dimensions.
 - 4. Operation characteristics.
 - 5. Complete customized listing of characteristics required. Indicate whether item is "As Specified" or "Proposed Substitution." Indicate any deviations on submittal. Mark out all non- applicable items. The terminology "As Specified" used without this customized listing is not acceptable.
 - 6. Wiring diagrams for the specific system.
 - 7. Coordination data to check protective devices.
 - 8. Working construction Drawings (Shop Drawings).
- D. Submittal Data:
 - 1. Individual Special Systems (Control Panels, etc.)
 - 2. Transformers.
 - 3. Potential and current transformers.
 - 4. Electrical Utilities material and equipment.
 - 5. Lighting Fixtures, Lamps and Accessories
 - 6. Service, Disconnects.
 - 7. Raceways, Fittings, and Supports.
 - 8. Conductors.
 - 9. Wire and Cable.

10. Wiring Devices.
 11. Instrumentation.
 12. Additional items that may be listed on the Schedules, Bill of Materials or specified on the Drawings.
- E. Submittal review is for general design and arrangement only and does not relieve the Contractor from any of the requirements of the Contract Documents. Submittals will not be checked for quantity, dimension, fit or proper technical design of manufactured equipment. Where deviations of substitute product or system performance have not been specifically noted in the submittal by the Contractor, provision of a complete and satisfactory working installation of equal quality to system specified is the sole responsibility of the Contractor.

1.8 TESTS

- A. Division 1 - Closeout Requirements.
- B. The Contractor shall be responsible for field testing all station service and other electrical systems and equipment shown on the Drawings. Testing of the generators and switchgear will be performed by the Authority after substantial completion.
- C. The Contractor shall prepare and submit a test plan for review and approval by the Authority.
1. Field testing cannot take place without an approved test plan.
 - a. The Test Plan shall outline the tests planned for each item of equipment.
 - b. The Test Procedures shall identify the test equipment to be utilized, the action of each test step and the expected result so that a test technician who has no knowledge of the details of the equipment design shall be able to successfully conduct the test.
 2. In the presence of the Authority,
 - a. Test the equipment and electrical circuits for proper connection, continuity, and absence of undesirable shorts and grounds.
 - b. Test wire and cable installation, when complete.
 - c. Check for continuity, visual damage, marking, and proper phase sequence before performing insulation testing.
 - 1) Megger bus work, switches, breakers and circuits phase-to-phase and phase-to-ground disconnecting and reconnecting equipment which cannot be meggered otherwise.
 - 2) The minimum acceptable steady-state value is 50 megohms. Ambient temperature and humidity during testing shall be recorded.

3. Verify operation, calibration, and settings of the meters, relays and indicating devices.
 4. Check all auxiliary equipment, i.e., heaters, thermostats, lights, and all illuminated indicating devices and lamps, and all audible alarm devices to verify that they function properly.
 5. Take station service equipment test load readings after all loads are connected. Obtain the maximum reading for each phase and neutral with all lighting, appliances, motors (as applicable use largest combination), and other loads connected to the panels in service.
 6. Check fuses with an ohmmeter; ring out wiring and busing; check operation of control and safety interlocks.
 7. Test motor driven equipment motors before energization. Insulation test shall consist of megohmmeter check phase-to-ground, per IEEE Standard 43 or manufacturer's recommendations.
 8. Load test each motor of motor driven equipment showing the following:
 - a. Nameplate ratings (horsepower), (speed), (voltage), (phase), (ampere rating of motor at full load).
 - b. Measured load in amperes on lines 1-2.
 9. Load test pump motors, noting the operating conditions at the time of the test. Motor test data shall show suction and discharge conditions (pressure, temperature, humidity, to where such conditions affect load).
 10. Overload heaters shall be checked and the size on each phase shall be noted at this time on the test sheet.
- D. Report all test results in writing. Where tests disclose problem areas, retest after the defect has been corrected.
- E. Demonstrate that the electrical installation is working by operating all electrical systems and equipment. Simulate control inputs, responses to outputs and alarm conditions and their acknowledgement, artificially where necessary, for complete system tests.
- F. Operate the electrical systems until acceptance of the work. Instruct operators in the correct operation of all electrical and control systems under your jurisdiction.
- G. Any rework or repair of equipment required during or as a result of the testing shall be done by the Contractor at no additional expense to the Authority.
- H. The Contractor shall furnish to the Authority at the time the project is accepted, any special tools, calibration equipment, and testing apparatus specified or furnished by the equipment manufacturer for the proper adjustment and maintenance of the electrical equipment provided.

1.9 CODES AND INSPECTIONS

- A. Electrical work shall be installed in accordance with the latest edition of the National Electric Code and local and state codes in legal force in the project area.
 - 1. If the Contractor observes that the 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.
- B. The above codes are referenced to establish minimum requirements and wherever this Specification requires higher grades of material or workmanship than required by the codes, this Specification shall prevail.
- C. All electrical work shall be performed by Alaska licensed Journeyman Electricians or licensed Apprentice Electricians under the direct supervision of a licensed Electrical Administrator.
- D. Submit written proof of all Journeyman and Apprentice Electricians' current licenses.
- E. Submit certification for tests and inspections required by the electrical inspector having jurisdiction. Certificates of approval that are issued shall be transmitted to the Authority.
- F. The Contractor shall pay all costs and fees required by inspecting and other agencies required for his work.
- G. Cooperate with the Authority and provide assistance at all times for the inspection of the electrical work performed under this Contract. Remove covers, operate machinery, or perform any reasonable work which, in the opinion of the Authority, will be necessary to determine the completeness, quality, or adequacy of the work.

1.10 COORDINATION

- A. Electrical 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 location of outlets and equipment are approximate unless dimensioned. The exact locations and routing of conduits shall be governed by structural conditions and physical interferences and by the location of electrical terminations on equipment. Equipment shall be located and installed so that it will be readily accessible for operation and maintenance.

- B. The Drawings and Specifications are complementary. What is shown on one is binding whether shown or specified in the other or not. Failure to check both the Drawings and the Specifications will not be grounds for a change order if additional equipment or material is required to be provided by the Contractor after the Engineer reviews, or deficiencies are identified during testing, either in the Factory or the field.
- C. If conduit is placed incorrectly with respect to equipment connections or if equipment connections are relocated without appropriate changes in the electrical work, and the resulting work is not coordinated, the work affected shall be removed and re-installed at the Contractor's expense, even if removal and replacement of structural and/or mechanical parts of the work are necessary.
- D. 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.
- E. The Contractor is responsible for maintaining required clear space. Should the Contractor become aware of a clear space violation, or if the installation of electrical equipment as shown produces a clear space violation, notify the Authority in writing before proceeding with the installation.

1.11 LOCATIONS

- A. If hazardous location boundaries exist, they will be shown on the Drawings. Locations for seal-off fittings shall be field determined by the Contractor.
- B. Wet Locations: Wet locations shall include all areas underground (below grade), in direct contact with the earth, areas subject to saturation with water or other liquids from splashing, surface water, exposed to the weather and unprotected.

1.12 RECORD DRAWINGS

- A. Division 1 – Project Record Documents.
- B. Reference requirements stated elsewhere in these Specifications.
- C. In addition to other requirements, mark up a clean set of Drawings as the work progresses, to show the dimensioned location and routing of all electrical work which will become permanently concealed. Show routing or work in permanently concealed blind spaces within the facility. Show complete routing and sizing of any significant revisions to the systems shown.

- D. Maintain Record drawings in an up-to-date fashion in conjunction with the actual progress of installation. "Record" progress mark-ups shall be available on-site for examination by the Authority at all times.
- E. Prepare wiring diagrams on reproducible media using AutoCAD V.2012 or later for all individual special systems as installed. Identify all components and show all wire and terminal numbers and connections.
- F. Prior to substantial completion, deliver these drawings and their electronic files in both .dwg and full size .pdf format to the Authority and obtain a written receipt.

1.13 PROJECT COMPLETION AND DEMONSTRATION

- A. Division 1 - Contract Closeout.
- B. Tests: During substantial completion inspection, conduct operating tests for approval.
- C. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents. Should a portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
- D. Have instruments available for measuring, voltage and current values and for demonstration of continuity, ground, or open circuit conditions. Furnish personnel to assist in taking measurements and making tests.

1.14 CERTIFICATE OF COMPLETION

- A. Submit, at time of request for Final Inspection, a completed letter in the following format:
 - I, _____(Name), of _____(Firm), certify that the Electrical Work is complete in accordance with Contract Drawings and Specifications, and authorized change orders (copies of which are attached hereto), and will be ready for Final Inspection as of _____(Date). I further certify that the following Specification requirements have been fulfilled:
 - 1. Megger readings performed, ____ copies of log attached.
 - 2. Record drawings up-to-date and ready to deliver to the Authority.
 - 3. Emergency systems tested and fully operational.

4. All other tests required by Specifications have been performed.
5. All systems are fully operational. Project is ready for Final Inspection.

SIGNED: _____

DATE: _____

TITLE: _____

1.15 WARRANTY

- A. Division 0 – Quality Assurance.
- B. Division 1 – Contract Closeout.

PART 2 – MATERIALS (NOT USED)

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. Division 1.
- B. Section 26 05 00 – Common Work Results for Electrical.
- C. All other Divisions 21, 23, 26, and 33 Specifications.

1.3 COORDINATION

- A. Layout all the work in advance and avoid conflict with other Work in progress. Physical dimensions shall be determined from Civil and Structural Drawings. 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 clear space 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 of an independent testing laboratory acceptable to the local Code-enforcement agency having jurisdiction.
- C. Products shall be identical with apparatus or equipment which has been in successful operation for at least two years. All products of similar class or service shall be of one manufacturer.
- D. Capacities, sizes, and dimensions given are minimum unless otherwise indicated. All systems and products proposed for use on this project shall be subject to review for adequacy and compliance with Contract Documents.

2.2 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 of an independent testing laboratory acceptable to the local Code-enforcement agency having jurisdiction.
- C. All work on the project that falls under the jurisdiction of the electrical trade shall be performed by Licensed Electricians in possession of Alaska State Fitness Cards in conformance with the Electrical Specifications.
- D. Provide complete power connections to equipment including but not limited to feeders, connections, disconnects and motor running overcurrent protection. Where starters are provided as part of a packaged product, overcurrent heaters shall be provided.

2.3 IDENTIFICATION

- A. Equipment Labels and Nameplates:
1. Provide rigid engraved labels and nameplates of laminated plastic 1/16-inch thick with white letters on a black or gray background. Label for emergency equipment shall be red with white letters.
 - a. Securely attach labels with two screws, minimum, per label, unless rating of panel is affected, use epoxy.
 - b. Temporary markings not permitted on equipment. Repaint trims housings, etc., where markings cannot be readily removed. Refinish defaced surfaces.
 - c. No labeling abbreviations will be permitted without prior approval.
 2. Label and Nameplate Locations:
 - a. Provide 1/2-inch minimum height letters on following equipment:
 - 1) Service disconnects (red background).
 - 2) Secondary feeder breakers in distribution equipment. Designation as required by load served.
 - 3) Special equipment housed in cabinets, as designated on 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. Conduits: Mark all conduits entering or leaving panels with indelible black magic marker with the circuit numbers of the circuits contained inside.
- C. Junction Boxes: Mark the circuit numbers of wiring on all junction boxes with steel covers. Mark with indelible black marker.
- D. Conductors:
1. Conductors shall be color coded as indicated on the Electrical Conductor Schedule on Sheet E1.1.
 2. Control and alarm circuit conductors
 - a. Field conductors shall be identified by destination panel and terminal block designations.
 - b. Internal (Control Panel) numbering system shall be provided by the Contractor. The numbering system shall assign each logical conductor set a unique identification number that will be reflected on the as-built drawings.

PART 3 – EXECUTION

3.1 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. Repair all surfaces and furnish all required products and labor to maintain fire-proof, air-tight and water-proof characteristics of the construction.
- D. Installation of all equipment shall be in accordance with manufacturer's instructions.

3.4 SUPPORT SYSTEMS

- A. All interior materials used shall be galvanized or zinc plated.
- B. All exterior materials used shall be stainless steel or hot dip galvanized. Where support elements are field cut, exposed metal shall be coated with spray-on galvanizing.

- C. Support from structure only.
- D. Conduits shown to be run at grade shall be supported by wood sleepers as shown on the Drawings. Conduits may share fuel piping sleepers if installed such that neither system will require removal during maintenance or replacement.

3.5 MOUNTING HEIGHTS

- A. Mounting heights shall be above finished floor (AFF) or above finished grade as noted below, unless otherwise shown or indicated.
 - 1. Lighting Switches, 48 inches to center
- B. Other mounting heights are indicated on the Drawings by detail.

3.6 CUTTING AND PATCHING

- A. Obtain written permission from the Authority before cutting or piercing structural members.
- B. Sleeves through floors and walls to be galvanized iron pipe, flush with walls, ceilings or finished floors, sized to accommodate the raceway. Interstitial space around conduit passing through sleeves shall be filled with non-hardening duct sealant.

3.7 PROTECTIVE FINISHES

- A. Take care not to scratch or deface factory finish on electrical apparatus and devices. Repaint all marred or scratched surfaces.
- B. Provide hot dip galvanized components for ferrous materials exposed to the weather.

3.8 CLEAN-UP AND COMMISSIONING

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

3.9 OPERATIONAL INSTRUCTIONS

- A. The Contractor shall instruct operators in the operation of the products shown and/or specified.

END OF SECTION

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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 grounding system complete 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 Electrical Materials and Methods.

1.3 MINIMUM REQUIREMENTS

- A. The minimum requirement for the system shall conform to Article 250 of the NEC.
- B. Provide products specified in the Section that are listed and labeled by a nationally recognized testing laboratory.
- C. Install products that comply with UL 467, “Grounding and Bonding Equipment.”

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 GROUNDING AND BONDING PRODUCTS

- 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. Aluminum material is not acceptable for use in any location.

2.2 WIRE AND CABLE CONDUCTORS

- A. Equipment Grounding Conductor: Bare or green insulated. Minimum size No. 12 AWG.
- B. Ground Grid or Grounding Electrode Conductor: Class B, concentric stranded.
 - 1. Bare Copper conductors: Conform to the following:
 - a. Solid Conductors: ASTM B-3.
 - b. Stranded Conductors: ASTM B-8.
 - c. Tinned Conductors: ASTM B-33.

2.3 GROUNDING ELECTRODES

- A. Copper clad steel 3/4"x10' with high-strength steel core and electrolytic-grade copper outer sheath, molten welded to core.
- B. Wherever the ground rod crosses the ground grid it shall be connected.

2.4 MISCELLANEOUS CONDUCTORS

- A. Ground Bus: Bare annealed copper bars of rectangular cross section.
- B. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bare copper wire, terminated with copper ferrules.
- C. Bonding Strap Conductor/Connectors: Soft copper, 0.05-inch-thick and 2 inches wide, except as indicated.

2.5 GROUND CONNECTIONS

- A. All underground ground connections shall be made with exothermic welds.
- B. Grounding conductor connections to building structure skids shall be made with mechanical or compression lugs as indicated or required.
- C. Provide all ground cable and ground rods as indicated on the Grounding Plan.

PART 3 – EXECUTION

3.1 SERVICE AND STRUCTURE GROUND

- A. Provide Service Ground.

- B. Create a Grounding Electrode System (GES) for this project by connecting the following:
 - 1. Grounding grid as shown on the Drawings.
 - 2. Generators, switchgear, and transformers grounded as shown on the Drawings.
 - 3. The neutral conductors grounded only where specifically indicated on the Drawings.
 - 4. Other items or equipment as indicated on the Drawings.
 - 5. Current carrying capacity of the grounding and bonding conductors shall be in conformity with Tables 250.66 and 250.122 of the NEC.
- C. All structure bonding shall be in accordance with manufacturer's recommended practice.

3.2 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 #6 AWG copper cable.

3.3 GROUNDING DRY-TYPE TRANSFORMERS

- A. Ground the secondary neutral point and the housing of each dry-type transformer. Connect these items together within the transformer housing and run a common grounding conductor from their point of connection to a point of grounding. The grounding electrode shall be in order of preference:
1. The nearest available effectively grounded structural metal member of the building or ground grid.
 2. Other electrodes as specified in National Electrical Code Section 250.30 where the above described electrodes are not available.

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 Electrical Materials and Methods.
- C. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

1.3 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 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. 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. 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
- C. Hanger Rods: Continuous threaded rod. Zinc plated carbon steel except for exterior installations provide hot dip galvanized.
- D. Fasteners: All bolts, nuts, and washers to be zinc plated carbon steel except on exterior installations provide hot dip galvanized or stainless steel. Fasteners 1/4" and smaller shall be 316 stainless steel.

2.4 EARTHQUAKE ANCHORAGE

- A. Anchor equipment weighing more than 100 pounds to the building structure to resist lateral earthquake forces.
- B. 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.
- C. Provide equipment supported by flexible isolation mounts with earthquake restraining supports positioned as close to equipment as possible without contact in normal operation (earthquake bumpers). The maximum lateral displacement due to the computed earthquake force from above shall not exceed 1.5 inches. Floor mounted equipment weighing less than 2000 pounds may have one 6-inch by 6-inch by 3/8-inch by 18-inch steel angle bolted to the floor with four 5/8-inch diameter bolts placed on each of four sides of the equipment.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Conduits and equipment shall be mounted using strut or similar supports, unless otherwise noted.
- B. Do not strap conduits to piping. When run in parallel with piping maintain adequate separation to allow maintenance to take place on either piping or conduit system so that the other does not have to be removed when maintenance is required.

END OF SECTION

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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 Plans, required by Code and specified in these Specifications.

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 05 26 – Grounding and Bonding 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.

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 and shall be UL listed.
- B. Fittings shall be designed for use with liquidtight flexible conduit and shall maintain electrical continuity throughout fittings and conduit.
- C. Liquidtight flexible metal conduit shall be 1/2-inch trade size or larger and shall be manufactured by O-Z/Gedney Co., Southwire Co., or approved equal.

2.4 RIGID PVC CONDUIT

- A. Rigid nonmetallic conduit shall be NEMA TC2, type EPA-80-PVC high impact, polyvinylchloride (PVC). Fittings used with PVC conduit shall be PVC solvent-weld type. Nonmetallic conduits shall be UL listed for their respective applications.

2.5 HIGH-DENSITY POLYETHYLENE (HDPE) CONDUIT (DUCT)

- A. HDPE conduit shall be Schedule 40 high-density polyethylene, black with red extruded stripes and NESC lightning bolt. Conduit shall meet or exceed the requirements of ICEA S-94-649 for polyethylene jackets. Standard wall thicknesses per NEMA TC7. HDPE material in accordance with ASTM D 3350; conduit dimensions in accordance with ASTM D3484. Conduit manufactured in accordance with ASTM F 2160.

2.6 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. 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.

- C. 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.

2.7 FITTINGS

- A. Fittings utilized with rigid steel shall be galvanized steel with threaded connections. 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.
- B. 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.
- 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.

2.8 WIREWAY

- A. Interior Use: UL listed; NEMA 1, enamel finished; hinged covers except where indicated otherwise. Furnish complete with all fittings, couplings, hangers and accessories; Hoffman, B-Line or approved equal.

PART 3 – EXECUTION

3.1 CONDUIT USAGE

- A. INTERIOR – All interior locations shall be electrical metallic tubing (EMT) except where specifically indicated as wireway.
- B. EXTERIOR – All exterior above grade locations shall be galvanized rigid conduit (GRC).

- C. BURIED – All exterior below grade locations shall be liquid tight flexible metal conduit, rigid PVC conduit, galvanized rigid conduit (GRC), or high-density polyethylene (HDPE) duct as specifically indicated on the Drawings.
- D. Liquidtight flexible metal conduit shall be used in lengths 18 to 24 inches for connections to motors or equipment subject to vibration and where indicated on the Drawings. Longer lengths may be used for equipment connection if grounding conductor is installed through conduit.

3.2 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. All metal conduits shall have insulating bushings and shall have locknuts inside and outside of enclosure box, etc. Conduits smaller than 1-1/4-inch trade size shall be equipped with bushings and shall have locknuts inside and outside of enclosure.
- G. All conduit runs shall be grounded in an effective and approved manner at point of origin and shall maintain a continuous ground throughout all runs, cabinets, pull boxes, and fittings from point of service to all outlets.
- H. Conduit Supports:
 - 1. Support conduits by wall brackets, pipe straps and strut sections, or trapeze hangers spaced not more than 10 feet on center.
 - 2. Conduits shall be supported from the structural system. Provide additional support as required for junction and pull boxes.
- I. 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.

- J. All spare conduits shall have a pull wire installed and securely tied off at each end for future conductor installation. Conduits not terminated in an enclosure shall be capped.
- K. All conduits where the destination is not obvious shall be provided with a permanent label identifying the termination point of the conduit.

END OF SECTION

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DIVISIONS 27 – 30

(NOT USED)

SECTION 31 05 19.13
GEOTEXTILES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Geotextile as specified on the Construction Documents.

1.2 RELATED REQUIREMENT

- A. Section 31 23 23 - Fill.

1.3 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 – PRODUCTS

2.1 WOVEN GEOTEXTILE – MEDIUM DUTY

- A. Geotextile shall be a fuel resistant, polypropylene, slit-film woven fabric designed and manufactured for the separation of soil.
- B. The geotextile shall be inert to commonly encountered chemicals and hydrocarbons and resistant to mildew, rot, ultraviolet light exposure, insects, and rodents.
- C. Provide AASHTO M288-06, Separation, Class 2, woven geotextile.
- D. The minimum average roll value (weakest direction) for strength properties of any individual roll tested from the manufacturing lot or lots of a particular shipment shall be in excess of the average minimum values specified in the following table.

<u>Property</u>	<u>Test Method</u>	<u>Minimum Value</u>
Grab Tensile Strength (any direction)	D4632	250 pounds
Grab Tensile Elongation	D4632	15%
CBR Puncture	D6241	750 lbs
Trapezoidal Tear (any direction)	D4533	120 pounds
UV Stability	D4355	70% at 500 hours
Apparent Opening Size (U.S. Sieve)	D4751	No. 40
Permittivity	D4491	0.1 sec ⁻¹

PART 3 – EXECUTION

3.1 PREPARATION

- A. Remove snow or ice with a depth of more than one inch prior to geotextile installation.

3.2 PROTECTION

- A. Ship and store geotextile in protective factory sun-bloc wrappings to prevent UV breakdown.
- B. Replace damaged geotextile at no additional cost to the Owner.
- C. Do not operate equipment directly on geotextile until at least 12 inches of protective cover has been placed.

3.3 INSTALLATION

- A. Install geotextile directly on tundra, subgrade, or prepared surface detailed on the Construction Documents.
- B. Roll out the geotextile and pull tight. Relax geotextile to follow contours. Lay out evenly with no folds or bunched fabric.
- C. Transverse end splices shall be no closer than 50 feet. All splices shall have a 3-foot minimum overlap.
- D. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

1.2 RELATED REQUIREMENTS

- A. Section 02 41 00 – Demolition: Removal of built elements and utilities.
- B. Section 31 23 23 – Fill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SITE CLEARING

- A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.2 EXISTING UTILITIES AND BUILT ELEMENTS

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

3.3 VEGETATION

- A. Clearing: Remove trees, down timber, stubs, brush, bushes, and debris from all designated areas.
- B. Grubbing: Remove and dispose of all stumps, roots, moss, grass, turf, debris, and other objectionable material within the excavation or fill limits, or other areas designated in the Plans.
- C. Do not remove or damage vegetation beyond the limits indicated on Drawings.
- D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
 - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
 - 2. Cut trees and brush to a height of not more than 12 inches above the surrounding ground surface.
- E. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

3.4 DEBRIS

- A. Remove debris, junk, and trash from site. Dispose of all vegetation and debris removed by clearing and/or grubbing off of property unless authorized otherwise.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.
- D. Comply with local ordinances and laws regardless of the location of disposal.
- E. All timber cleared in accordance with the Contract Documents becomes the property of the Contractor.

END OF SECTION

SECTION 31 22 00
GRADING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Rough grading the site around meter vaults.
- B. Finish grading.

1.2 RELATED REQUIREMENTS

- A. Section 31 10 00 - Site Clearing.
- B. Section 31 23 16 - Excavation.
- C. Section 31 23 23 - Fill: Filling and compaction.
- D. Section 32 92 19 - Seeding: Finish ground cover.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Fill Materials: See Section 31 23 23.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

- D. Protect site features to remain, including but not limited to bench marks, survey control points, and existing structures, from damage by grading equipment and vehicular traffic.

3.3 ROUGH GRADING

- A. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- C. When excavating through roots, perform work by hand and cut roots with sharp axe.
- D. See Section 31 23 23 for filling procedures.
- E. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify subgrade has been contoured and compacted.

3.5 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.6 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

3.7 FIELD QUALITY CONTROL

- A. See Section 31 23 23 for compaction density testing.

END OF SECTION

SECTION 31 23 16
EXCAVATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Excavating and trenching for site structures and utilities.

1.2 RELATED REQUIREMENTS

- A. Document Appendix A: Geotechnical report; bore hole locations and findings of subsurface materials.
- B. Section 31 23 23 – Fill: Fill materials, filling, and compacting.

1.3 SUBMITTALS

- A. Work Plan: Cover all aspects germane to excavation, safety, and erosion for the plan.
- B. Dewatering Plan: If required by Plans or Special Provisions, or if requested by the Engineer, submit plan no less than 14 calendar days prior to starting excavations covered by the plan. The dewatering plan should, at a minimum, include the following:
 - 1. Basis for estimating volume of water or flow rate(s) required to properly dewater excavations.
 - 2. Assessment of effects of various failure scenarios.
 - 3. How other work will be completed in conjunction with carrying out dewatering plan.
 - 4. Equipment and arrangement of equipment that will be used to dewater excavations.
 - 5. Personnel and their roles in carrying out the dewatering plan.
 - 6. Contingencies for circumstances such as increased flow rate, equipment failures, water contamination, or imprisonment of workers.
 - 7. Details about discharge of water such as location and prevention of erosion.
 - 8. Other details as necessary to demonstrate that dewatering will remove water sufficiently to properly complete the Work.

1.4 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.

3.2 EXCAVATING

- A. Excavate to accommodate new structures and construction operations.
- B. Conduct field screen testing throughout the duration of excavation to identify any soil contamination.
- C. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- D. Comply with OSHA Title 24, Part 1926, Subpart P for trench safety.
- E. Do not interfere with 45 degree bearing splay of foundations.
- F. Cut utility trenches wide enough to allow inspection of installed utilities.
- G. Hand trim excavations. Remove loose matter.
- H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- I. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.
- J. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- K. Remove excavated material that is unsuitable for re-use from site.

3.3 DEWATERING

- A. Obtain discharge authorization under the Alaska Department of Environmental Conservation AKG002000 – Excavation Dewatering General Permit.
- B. Furnish, install, and operate all necessary equipment to keep excavations above the foundation level free from water during construction, and dewater and dispose of the water so as not to cause injury to public or private property or nuisance to the public.
- C. Sufficient pumping equipment in good working condition shall be available at all times for all emergencies, including power outage, and shall have available at all times competent workers for the operation of the pumping equipment.
- D. Drain or pump any water from the pit, taking care not to stir up or soften the bottom.

3.4 SHORING

- A. Shoring shall be installed as required by local, state, and federal laws and regulations.
- B. Structural Shoring will be required when, in the opinion of the Engineer, excavation slopes may result in instability of adjacent structures, roadways, utilities, or private property. The Engineer will consider factors including the contents of the Excavation Plan when deciding if Structural Shoring will be required.
- C. When Structural Shoring is required, the Excavation Plan shall include analyses for its design.
- D. Remove all shoring upon completion of work.
- E. Shoring to be removed, or moveable trench shields or boxes, shall be located at least 2-1/2 pipe diameters away from metal or thermoplastic pipe if the bottom of the shoring, shield, or box extends below the top of the pipe, unless a satisfactory means of reconsolidating the bedding or side support material disturbed by shoring removal can be demonstrated.

3.5 STRUCTURE EXCAVATION

- A. Trench boxes may be used for Structure Excavation. Submit the manufacturer's certified trench box plans containing Professional Engineer's stamp and seal, depth restrictions, and serial number for field verification of trench box.

- B. The Contractor may dig open pits or perform extra excavation without shoring if:
 - 1. Structure can be placed in dry material away from running water.
 - 2. The integrity of the completed Structure and its surroundings is not reduced.
 - 3. Worker safety is ensured as required by law.
 - 4. The excavation does not disturb the existing pavement or any other adjacent structural elements.

- C. If a slide occurs in an open pit, the Contractor shall remove the slide material. If the slide disturbs an area over which a structure or pavement will be built, the Contractor shall backfill and compact the site to the original ground line as approved by the Engineer. If the slide damages an existing facility, the Contractor shall repair the damage caused by the slide at no cost to the Government.

- D. The Contractor may omit forms when the earthen sides of a footing excavation will stand vertically. In this case, the Contractor may excavate to the neat line dimensions of the footing and pour concrete against the undisturbed earth. If the hole is larger than neat line dimensions, the Contractor shall bear the cost of the extra concrete.

- E. For open temporary cuts, the following requirements shall be met:
 - 1. No vehicular or construction traffic, or construction surcharge loads will be allowed within a distance of 5 feet from the top of the cut.
 - 2. Exposed soil along the slope shall be protected from surface erosion.
 - 3. Construction activities shall be scheduled so that the length of time the temporary cut is left open is reduced to the extent practical.
 - 4. Surface water shall be diverted away from the excavation.

- F. When a foundation will rest on rock, excavation shall penetrate it at least 1-foot, or more if the Plans require, to form a key for the footing. The Contractor shall cut the bottom of the excavation to a firm surface, level, stepped, or serrated as required, and remove all loose material.

- G. If concrete will rest on any excavated surface other than solid rock, the Contractor shall not disturb the bottom of the excavation. The Contractor shall also remove all loose or soft material just before pouring the concrete.

- H. Upon completing any foundation excavation, the Contractor shall notify the Engineer. No concrete or other permanent part of the Structure may be placed until the Engineer has inspected.

- I. The Engineer may stop the excavation to make bearing tests at any time. The Contractor shall assist with these tests. During any test period, the Contractor shall, at no expense to the Government, maintain ordinary working conditions at the bottom of the hole.
- J. The hole for any catch basin or manhole shall provide at least 1-foot of clearance between outside structural surfaces and the undisturbed earth bank.

3.6 PIPE TRENCH EXCAVATION

- A. The length of trench excavation in advance of pipe laying shall be kept to a minimum. Excavations shall either be closed up at the end of the day or protected.
- B. The trench width all pipes, pipe arches, structural plate pipes shall be:
 - 1. For drain and underdrain pipes, trench width = I.D. + 12 inches.
 - 2. For pipes 15-inches and under, trench width = I.D. + 30 inches.
 - 3. For pipes 18-inches and over, trench width = (1.5 x I.D.) + 18 inches.
- C. All ledgerrock, boulders, and stones shall be removed to provide a minimum of 6-inches clearance under all portions of the pipe prior to placement of bedding material.
- D. When, after excavating to the foundation level, the material remaining in the trench bottom is determined to be unsuitable, excavation shall be continued to such additional depth and width as required. Unsuitable foundation materials shall be disposed of at an approved site. The trench foundation shall be backfilled to the bottom of the pipe zone with Pipe Bedding, or other suitable material, and compacted to form a uniformly dense and unyielding foundation.
- E. Where a pipe is to be constructed in a new fill, the fill shall first be constructed as shown in the Plans or as designated, for a distance each side of the pipe location of not less than 5 times the pipe diameter and to a minimum height of not less than one half of the outside diameter of the pipe (above final location of top of pipe). Once the embankment is so constructed, including compaction in accordance with these Specifications, the pipe trench can be excavated.

3.7 OVEREXCAVATION

- A. When soft or otherwise unsuitable materials are found in zones that will adversely affect the project, those materials shall be excavated and replaced with compacted granular fill as directed.

- B. When water fills an area after the removal of soft or unstable materials, the Contractor shall, if possible, drain the site so that any backfill may be compacted.
- C. If drainage is not possible, the Contractor shall use granular material for backfilling in water.
- D. The costs of pumping or digging temporary drainage ditches shall be incidental to and included in other items of Work that apply.

3.8 FIELD QUALITY CONTROL

- A. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.9 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 23 23

FILL

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Filling, backfilling, and compacting for site structures and utilities.
- B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.2 RELATED REQUIREMENTS

- A. Document Appendix A: Geotechnical Report; bore hole locations and findings of subsurface materials.
- B. Section 03 30 00 – Cast-in-Place Concrete.
- C. Section 31 05 19.13 – Geotextiles.
- D. Section 31 10 00 – Site Clearing.
- E. Section 31 22 00 – Grading: Site grading.
- F. Section 31 23 16 – Excavation.
- G. Section 32 31 13 – Chain Link Fences and Gates.
- H. Section 32 92 19 – Seeding.

1.3 DEFINITIONS

- A. ATM: Alaska Test Method (see Alaska Test Manual).
- B. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support side of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- C. Base Course: Layer placed between the subgrade/subbase course and the gravel surface course.

- D. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- E. Borrow: Satisfactory soil imported from off-site source for use as a fill or backfill.
- F. Completed Course: A course or layer that is ready for the next layer or next phase of the work.
- G. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- H. Dust Ratio: The percent of material passing the U.S. No. 200 sieve divided by the percent of material passing the U.S. No. 40 sieve.
- I. Embankment: The fill material required to raise the existing grade in all areas.
- J. Excavation: Removal of material encountered above subgrade elevations.
- K. Fill: Granular, gravel, and soil materials used to raise existing grades.
- L. Granular Material or Soil: Soil which is classified as sand or gravel when tested in accordance with ASTM D2487 and D2488.
- M. Imported Material: Material obtained by the Contractor from sources off-site.
- N. Influence Area: The area within planes sloped downward and outward at an angle of 45 degrees from the horizontal from:
 - 1. 1 foot outside the outermost edge at the base of foundations or slabs.
 - 2. 1 foot outside the outermost edge at the surface of roadways or shoulder.
 - 3. 0.5 foot outside the exterior edge at the spring line of pipes and culverts.
- O. Maximum Density: The laboratory maximum dry density as determined by ASTM D1557 (modified proctor).
- P. Non-Frost Susceptible (NFS) Gravel: Well graded gravel fill with a measured heave rate per day not exceeding 2 mm/day per ASTM D 5918.
- Q. Optimum Moisture Content: As determined by ASTM D 1557, the optimum moisture content corresponds to the maximum dry density. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.
- R. Organics: Highly organic soil ASTM D2487 Group PT, topsoil, roots, vegetable matter, trash and debris.

- S. Prepared Ground Surface: The ground surface after clearing, grubbing, stripping, excavation, and scarification and/or compaction.
- T. Selected Backfill Material: Material available on-site that the Engineer determines to be suitable for a specific use.
- U. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- V. Subbase Course: Layer placed between the subgrade and base course for gravel surface course, or layer placed between the subgrade and a concrete pavement or walk.
- W. Subgrade: Surface or elevation remaining after completing clearing or excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- X. Truck Measure: Truck volume determined by leveling off selected loads in the truck box after the material has been transported from the site of loading to the site of placement. The Engineer may call for such measurement at any time. The Contractor shall cooperate with the Engineer in the measurement, and they shall together determine and agree upon the volume of material in the truck box.
- Y. Unclassified Excavation: The nature of materials to be encountered has not been identified or described herein.
- Z. Unsuitable Material: Highly organic soil and fine-grained soils ASTM D 2487 Group PT, topsoil, roots, vegetable matter, trash, debris and ice chunks larger than three inches in any dimension.
- AA. Utilities: Overhead, above-grade, at-grade, or underground pipes, conduits, ducts, and cables.
- AB. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass, free from detrimental voids.
- AC. WAQTC: Western Alliance for Quality in Transportation Construction.

1.4 REFERENCE STANDARDS

- A. ASTM D75 - Standard Practice for Sampling Aggregates.
- B. ASTM C117 - Standard Test Method for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
- E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- F. Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
- G. Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)).
- H. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- I. ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
- J. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- K. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- L. ASTM D5918 - Standard Test Methods for Frost Heave and Thaw Weakening Susceptibility of Soils.
- M. ATM 313 - Degradation Value of Aggregate.
- N. WAQTC Field Operating Procedure for AASHTO T90 - Determining the Plastic Limit and Plasticity Index of Soils.
- O. WAQTC Test Method for AASHTO T335 - Determining the Percentage of Fracture in Coarse Aggregate.

1.5 SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures.
- B. Samples: 5-gallon sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Compaction Control Plan: Not less than 14 calendar days before placing any fill that requires compaction control.
- E. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including laboratory gradation, maximum laboratory density, optimum moisture content, and frost susceptibility classification. Submit not less than three calendar days before material represented by tests is first placed into the Work.
 - 1. Interim laboratory gradation and moisture content test results for all fill taken during construction for Quality Assurance. Sample frequency shall be one sample per 4,000 CY.
- F. Compaction Density Test Reports and In-Place Moisture Content: Submit no more than 24 hours following completion of the tests they represent.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
 - 1. Laboratory and field testing shall be performed by personnel with current corresponding WAQTC certification(s).
- B. Quality Assurance testing required by these Specifications shall be performed on representative samples of materials delivered to the project site. Unless authorized by the Engineer in writing, results of test performed for other projects or on materials collected from offsite stockpiles will not be acceptable.
- C. Collect soil and aggregate Quality Assurance testing samples in accordance with ASTM D75. Quality Assurance test results may be rejected if Contractor cannot provide proper documentation of sampling procedures.
- D. Quality Assurance test results shall include certification that sampling and testing was performed in accordance with the specified standards.

- E. Until required Quality Assurance test results are submitted and approved, covering, obscuring, or otherwise making the Work represented by the testing inaccessible will be at the Contractor's risk. If Quality Assurance testing indicates nonconformance with these Specifications, the Contractor shall remove and replace portions of the Work as directed by the Engineer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where designated.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination.
 - 3. Protect stockpiles from erosion and deterioration of materials.

1.8 CONTAMINATED SOILS

- A. Contractor shall notify the Authority if contaminated soils are encountered.

PART 2 – PRODUCTS

2.1 FILL MATERIALS

- A. Granular Fill - Gravel - Fill Type NFS: Pit run washed stone; free of shale, clay, friable material, organics and debris.
 - 1. Dust Ratio: 2/3 maximum.
 - 2. Sand Equivalent: 60 minimum.
 - 3. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 4 inch sieve: 100 percent passing.
 - b. 2 inch sieve: 75 to 100 percent passing.
 - c. No. 4 sieve: 22 to 66 percent passing.
 - d. No. 200: 0 to 4 percent passing.
 - 4. Classified according to the U.S. Army Corps of Engineers frost design soil classification system. Classification shall be negligible heave rate to low heave rate, not to exceed 2 mm/day.

- B. Granular Fill - Gravel - Fill Type Trench Backfill: Pit run washed stone; free of shale, clay, friable material, organics and debris.
1. Dust Ratio: 2/3 maximum.
 2. Sand Equivalent: 30 minimum.
 3. Stabilometer "R" Value: 72 minimum.
 4. Swell Pressure: 0.3 psi maximum.
 5. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 2-1/2 inch sieve: 100 percent passing.
 - b. 2 inch sieve: 75 to 100 percent passing.
 - c. No. 4 sieve: 22 to 100 percent passing.
 - d. No. 200: 0 to 6 percent passing.
- C. Sand Bedding: Aggregate containing no muck, frozen material, roots, sod or other deleterious matter and with a plasticity index not greater than 6 as determined by ATM 204 and ATM 205.
1. Graded in accordance with ASTM 304; within the following limits:
 - a. 3/8 inch sieve: 100 percent passing.
 - b. No. 4 sieve: 50 to 100 percent passing.
 - c. No. 40 sieve: 30 to 60 percent passing.
 - d. No. 100 sieve: 10 to 40 percent passing.
 - e. No. 200 sieve: 0 to 6 percent passing.
- D. Surface Course: Crushed base and surface course materials shall be manufactured from bedrock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material.
1. L.A. Abrasion (500 rev.): 45% maximum.
 2. Sand Equivalent: 40 minimum.
 3. Degradation: 45 minimum.
 4. Percent Fracture: 70 minimum.
 5. Liquid Limit: 35 maximum.
 6. Plastic Limit: 6 maximum.
 7. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 3/4 inch sieve: 100 percent passing.
 - b. 1/2 inch sieve: 80 to 100 percent passing.
 - c. No. 4 sieve: 45 to 65 percent passing.
 - d. No 40 sieve: 6 to 20 percent passing.
 - e. No. 200: 0 to 8 percent passing.

- E. Topsoil: Topsoil excavated on-site or imported.
 - 1. Sandy silt or silty organic or loam material.
 - 2. Free of branches and roots exceeding 3/4 inch, stones larger than 2 inches, subsoil, large weeds, and foreign matter. Free of noxious weeds.
 - 3. Minimum 40% silt.
 - 4. pH 7.0.
 - 5. Correct acidic soils with lime, and Alkaline soils with Sulphur or gypsum.
 - 6. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
 - 7. Conforming to ASTM D2487 Group Symbol OH.

2.2 ACCESSORIES

- A. Water: Use fresh water to increase moisture content of fill materials as necessary to achieve optimum compaction.

2.3 SOURCE QUALITY CONTROL

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.

3.2 PREPARATION

- A. Scarify subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type Gravel Base.

- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
 - 1. Do not incorporate frozen materials into fill. When excavation is performed when freezing weather is imminent, place the specified backfill promptly, following the excavation work, at least up to a level which will allow the surface to adequately drain. Make arrangements for the timely availability of such fill materials prior to commencement of the stripping or excavation operations, when required.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Place fill materials in horizontal layers of uniform thickness. Compact to the required density as the fill is constructed, not afterwards.
- E. Shape the surfaces of fills to uniform cross-sections and eliminate all ruts and low places that could hold water.
- F. Raise the center of a fill above the sides. When the surface of an embankment intersects a side hill, the surface shall be sloped away at a rate not to exceed 20:1.
- G. Bench existing slopes that are steeper than 4H:1V when fills are to be placed and compacted against them. Continually bench over those areas as the work is brought up in layers. Make benches wide enough to permit placing and compacting operations. Begin each horizontal cut at the intersection of the original ground and the vertical side of the previous bench.
- H. When fill is to be placed and compacted on both sides of a structure such as a concrete wall, keep the embankment at approximately the same elevation on both sides of the structure.

- I. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth below the top 2 feet. Within the top 2 feet, place and compact materials in equal continuous layers not exceeding 4 inches compacted depth.
- J. Based on the location and compaction characteristics, the Engineer may permit the Contractor to increase layer thickness up to 18-inches before compaction, provided:
 - 1. Fill material is granular;
 - 2. The layer is more than 2-feet below the top of the fill;
 - 3. An approved vibratory roller is used, and
 - 4. The Contractor can document to the satisfaction of the Engineer that the required density is obtained throughout the full depth and width of each layer. This may require that additional compaction testing be completed at no cost to the Authority.
- K. Correct areas that are over-excavated.
 - 1. Other areas: Use Fill Type Gravel Base, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

3.4 COMPACTING

- A. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. At other locations: 95 percent of maximum dry density.
- B. Compact all materials by mechanical means. Use equipment of suitable type to obtain the amount of compaction specified. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.
- C. Reshape and re-compact fills subjected to vehicular traffic.
 - 1. Repair at no cost to the Authority any portions of fills that lose stability because of continued hauling across it. Evidence of lost stability shall include pumping or rutting. The Contractor shall also alter hauling equipment or procedures to prevent further damage.

3.5 MOISTURE CONTROL

- A. Maintain optimum and uniform moisture content required to achieve maximum density.

- B. Adjust moisture content during compaction to produce a firm and unyielding fill within the limits described below. Do not begin compaction until the moisture content is so adjusted.
 - 1. The moisture content shall not vary more than 3-percent above or below optimum as determined by ASTM D1557.
 - 2. The Engineer may permit the Contractor to place materials having a higher moisture content than specified in this subsection if:
 - a. The material consists of free-draining granular material that compacts to a firm, unyielding surface
 - b. The excess moisture will not impair the fill.
 - 3. However, the Engineer may at any time require the Contractor to return to normal moisture-content specifications.
 - 4. The costs of adjusting the moisture content of fill material to be incidental to other Work.

- C. Aerate materials that contain excessive moisture by blading, discing, harrowing, cutting drainage trenches, or other methods approved by Engineer.

3.6 FILL AT SPECIFIC LOCATIONS

- A. Buried Utility Piping, Conduits, and Duct Bank in Trenches:
 - 1. Bedding: Use Fill Type Pipe Bedding.
 - 2. Cover with Fill Type Trench Backfill.
 - 3. Fill up to subgrade elevation.
 - 4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

- B. At Lawn Areas:
 - 1. Use Fill Type Topsoil.
 - a. Fill up to finish grade elevations.
 - b. See Section 31 22 00 for topsoil placement.

- C. Driving Surfaces:
 - 1. Use Fill Type Surface Course.
 - a. Fill up to finish grade elevations.
 - b. Compact to 95% of maximum dry density.

3.7 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.8 FIELD QUALITY CONTROL

- A. Perform compaction density testing on compacted fill in accordance with ASTM D1556/D1556M, ASTM D2167, or ASTM D6938.
- B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 1557 ("modified Proctor").
- C. Determine field soil moisture content in accordance with ASTM D2216, ASTM D4643, or ASTM D6938.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Tests: One per 3,000 square feet, with no fewer than one test per lift.

3.9 CLEANING

- A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases; concrete foundation for posts.
- C. Manual gates and related hardware.

1.2 REFERENCE STANDARDS

- A. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire; 2013.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).
- E. ASTM A428/A428M - Standard Test Method for Weight (Mass) of Coating on Aluminum-Coated Iron or Steel Articles; 2010 (Reapproved 2014).
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015, with Editorial Revision (2016).
- G. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2017.
- I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.

- J. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.
- K. ASTM F626 - Standard Specification for Fence Fittings.
- L. ASTM F900 - Specification for Industrial and Commercial Swing Gates.
- M. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2017a.
- N. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2016.
- O. CLFMI CLF 2445 - Product Manual; 1997.

1.3 SUBMITTALS

- A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- C. Manufacturer's Installation Instructions.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Posts, Rails, and Frames: ASTM F1083 Schedule 40 hot-dipped galvanized steel pipe, welded construction, minimum yield strength of 30 ksi. Posts: Provide Class 1, Grade A pipe with a minimum zinc coating of 1.2 ounces per square foot of surface. Lengths as shown on Drawing
- B. Wire Fabric: ASTM A392 zinc coated steel chain link fabric.
- C. Barbed Wire: Zinc-coated steel, complying with ASTM A121 Type Z Coating Class 1; 2 strands of 0.099 inch diameter wire, with 4-pointed barbs at 5 inches on center.

2.2 COMPONENTS

- A. Line Posts: Use 2.375 inch outside diameter galvanized standard weight steel pipe, weight 3.65 pounds per linear foot.
- B. Corner Gate, and Terminal Posts: Use 2.875 inch outside diameter galvanized standard weight steel pipe, weight 5.80 pounds per linear foot.
- C. Top and Brace Rail: Use 1.66 inch outside diameter galvanized standard weight steel pipe, weight 2.27 pounds per linear foot.
- D. Gate Frame: Use 1.9 inch outside diameter galvanized standard weight steel pipe, weight 2.72 pounds per linear foot for welded fabrication.
- E. Fabric: 2-inch diamond mesh interwoven wire, 9 gauge, 0.1144-inch thick, top selvage twisted tight, bottom selvage twisted tight. Galvanized after weaving.
- F. Tension Wire: 7 gauge, 0.177-inch thick steel, single strand.
- G. Tension and Brace Bands: Galvanized pressed steel complying with ASTM F626, minimum steel thickness of 12 gauge, minimum width of 3/4 inch and minimum zinc coating of 1.20 oz/ft².
- H. Tension Bars: In compliance with ASTM F626. Galvanized steel one-piece length 2 inches less than the fabric height. Minimum zinc coating 1.2 oz. /ft². Bar shall have a minimum cross section of 3/16 in. (4.8 mm) by 3/4 in. (19 mm).
- I. Wire Ties: 9-gauge galvanized steel wire for attachment of fabric to post and bracing. Hog ring ties of 9-gauge for attachment of fabric to tension wire.

2.3 ACCESSORIES

- A. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, Rail Sleeves: Cast steel galvanized; sized to post diameter. In compliance to ASTM F626, pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 oz/ft².
- B. Barbed Wire Arms: In compliance with ASTM F626, pressed steel galvanized after fabrication, minimum zinc coating of 1.20 oz. /ft², capable of supporting a vertical 250 lb. load.
- C. Truss Rod Assembly: In compliance with ASTM F626, 3/8 in. diameter steel truss rod with a pressed steel tightener, minimum zinc coating of 1.2 oz/ft², assembly capable of withstanding a tension of 2,000 lbs.

- D. Swing Gates: Single opening. Galvanized steel welded fabrication in compliance with ASTM F900. Gate frame members 1.900 inches OD ASTM F1043 Group IA F1083 schedule 40 pipe. Frame members spaced no greater than 8 feet apart vertically and horizontally. Welded joints protected by applying zinc-rich paint in accordance with ASTM Practice A780. Positive locking gate latch fabricated of 5/16 in. thick by 1-3/4" pressed steel galvanized after fabrication. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges. Match gate fabric to that of the fence system.
- E. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Corner, Gate, and Terminal posts will be set in concrete. Line posts may be driven or set in concrete.
- B. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- C. Post holes shall be drilled to a minimum depth as shown on the Drawings. Space posts 10 feet on centers and in true lines. Set posts plumb and to the depth specified. Contractor may submit alternate method of post installation to Engineer for review.
- D. Augering: Use augering equipment of proper size. Pre-drill hole diameters a minimum 3 inches larger than the post to be set or as indicated on Drawings.
- E. Protection of Augered Holes: Keep holes dry. Augered holes shall not be allowed to stand open for more than 24 hours after drilling.
- F. Mixing Concrete: Mix cement and aggregate materials with enough potable water to produce the specified slurry fill the annular space surrounding each post. Maintain slurry at a temperature at least 40° F. The slurry shall be mixed in a concrete mixer to obtain a uniform mixture. Place concrete backfill in 1 lift. Each lift must be thoroughly densified with a concrete vibrator.
- G. Set posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- H. Place fabric on outside of posts and rails.

- I. Tension chain-link fabric as specified by manufacturer. Fasten chain link fabric to end, corner, pull or gate posts with tension bars and bands.
- J. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- K. Provide top rail through line post tops and splice with 6-inch long rail sleeves.
- L. Position bottom of fabric 2 inches above finished grade.
- M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install support arms sloped outward and attach barbed wire; tension and secure.
- P. Install hardware and gate with fabric and barbed wire overhang to match fence.

END OF SECTION

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SECTION 33 61 13
UNDERGROUND HYDRONIC ENERGY DISTRIBUTION

PART 1 – GENERAL

1.1 SUMMARY

- A. Pre-insulated arctic pipe system for not to exceed 200F glycol/water service at 90 psi in direct burial installation. Provide press-fit couplings, adapters, sleeves, shells/couplings, end caps, insulation, shrink sleeves, pre-fabricated steel Z-bend transitions, and all other components required for a complete installation. Heat trace and alarm wires are not required. Install all piping in accordance with manufacturer's instructions.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Requirements for Mechanical.
- B. Section 23 21 13 - Hydronic Piping.
- C. Division 31.

1.3 REFERENCES

- A. ASTM – American Society for Testing and Materials:
 - 1. ASTM F876 – Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
 - 2. ASTM F877 – Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
 - 3. ASTM F2080 – Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-Linked Polyethylene (PEX) Pipe.
- B. CSA – Canadian Standards Association:
 - 1. CSA B137.5 – Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
- C. DIN – German Institute for Standardization (Deutsches Institut für Normung):
 - 1. DIN 4726 – Plastic Piping Used in Warm Water Floor Heating (Warmwasser - Fußbodenheizungen und Heizkörperanbindungen - Rohrleitungen aus Kunststoffen).

- D. ISO – International Organization for Standardization:
 - 1. ISO 9001 – Quality Management Systems – Requirements.
- E. PPI – Plastic Pipe Institute
 - 1. PPI TR-3 – Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB), Strength Design Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

1.4 SYSTEM DESCRIPTION

- A. PEX to be designated as PEXa and be manufactured by the high-pressure peroxide (Engel) method.
- B. Where more than one piping system material is specified, provide compatible system components and joints.
- C. Provide continuous sections of PEX to minimize buried joints as indicated on the Drawings. Provide couplings where required and as indicated on the Drawings.

1.5 SUBMITTALS

- A. Provide submittals for all products and systems described herein. Provide in accordance with the requirements of Section 23 05 00 – Common Work Results for Mechanical and Division 1.
- B. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, adapters and accessories. Submit manufacturers catalog information, specifications, and installation instructions.
 - 2. Submit shop drawings for pre-fabricated steel Z-bend Risers.
 - 3. Joint Kits: Submit manufacturers catalog information, specifications, and installation instructions.
 - 4. Rigid Insulation.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 CLOSEOUT

- A. Division 1 – Contract Closeout.

1.7 QUALITY ASSURANCE

- A. Division1 – Quality Control.
- B. Install and test products in accordance with manufacturer's installation instructions, including storage and handling, installing pipe, fittings, and accessories, building entries, field insulation kits, and testing.

1.8 QUALIFICATIONS

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

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipe in banded coils cut to the length required. The coils shall remain strapped or banded while in storage and should not be uncoiled until time of installation.
- B. Accept materials on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation. Maximum accumulated UV exposure to not exceed one year for outer jacket.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 COORDINATION

- A. Section 01 11 13 – Work Covered by Contract Documents: Coordination.

1.12 WARRANTY

- A. The pipe manufacturer shall warrant the crosslinked polyethylene carrier pipe to be free from defects in material and workmanship for a period of twenty-five (25) years.

PART 2 – PRODUCTS

2.1 CARRIER PIPE

- A. Crosslinked polyethylene (PEX) carrier pipe shall conform to the requirements of one or more of the following: ASTM F876, ISO 15875 or DIN 16892 and/or DIN 16893. PEX carrier pipe shall have a minimum degree of crosslinking of 70% when tested in accordance with ASTM D2765, Method B.
- B. Oxygen Diffusion Barrier: Coextruded barrier layer that limits oxygen diffusion through the PEX carrier pipe to less than 0.32 mg/(m²*day) at 40°C temperature, as defined by DIN 4726, shall be applied to the PEX carrier pipe.
- C. Provide cross linked PEXa (Engel method oxygen barrier) single carrier pipe, diameter as indicated. Continuous corrugated seamless polyethylene outer jacket. Foamed in place polyurethane insulation (0.015 btu/hr-ft-f). Insulation to completely fill the annular space between the carrier pipe and jacket to create a fully bonded system that will expand and contract as a unit. Tees, elbows, couplings and sleeves to be hot forged brass or cast bronze. Weld end adapters to be carbon steel. All connections to be with press-fit compression fittings except where indicated as welded. Threaded or bolted compression fittings will not be accepted. Rehau Insulplex, Perma-Pipe PEX-GARD, Rovanco Rhinoflex or approved equal.

2.2 PREFABRICATED STEEL Z-BEND TRANSITIONS

- A. Carrier pipe ASTM A53B, ERW black steel, Schedule 40, with ASTM A234 seamless carbon steel butt weld elbows. Provide carbon steel barbed end weld adapters where indicated, Rehau or approved equal.
- B. Nominal 1.5" polyurethane insulation and HDPE jacket, Perma-Pipe Xtru-Therm, Rovanco, or approved equal. Dimensions and layout as indicated on Drawings.

2.3 JOINT KITS

- A. Straight joint kits to include polyethylene shells and HDPE shrink casings, Canusa or approved equal, to form a continuous watertight jacket. Insulation to be rigid urethane foam half shells or flexible closed cell foam sheets.
- B. Provide complete joint insulation kits including all required foam filler attachments, plugs, sealing rings, heat shrink tape, etc. required for installation.
- C. Kits at reducing tees and at PEX to steel connections to allow for outside diameter (O.D.) variations. Any difference in O.D. between pipe, fittings and joint kits must not exceed the allowable shrink tolerance of the supplied heat shrink casing.

2.4 RIGID INSULATION

- A. Rigid insulation for installation below grade shall be minimum 25 PSI compressive strength extruded polystyrene (XPS) rigid insulation, Dow Styrofoam Square Edge or approved equal. Expanded polystyrene insulation will not be accepted.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Section 01 11 13 – Work Covered by Contract Documents: Coordination.

3.2 PREPARATION

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

3.3 INSTALLATION - PIPING SYSTEMS

- A. Carefully lay out sections of PEX to minimize buried joints as indicated on the Drawings.
- B. Install piping to allow for expansion and contraction and for differential ground movement without stressing pipe, joints, or connected equipment.
- C. Install pipe, fittings, and insulation joint kits in accordance with manufacturer's instructions.
- D. Install rigid insulation centered over pipes continuous as indicated on Drawings. Level and compact pipe bedding material prior to installing insulation.
- E. Install caution tape continuous as indicated on Drawings.

3.4 TESTING

- A. See Section 23 21 13 – Hydronic Piping.

3.5 SYSTEM START-UP

- A. See Section 23 21 13 – Hydronic Piping.

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SECTION 33 71 00.10
OVERHEAD ELECTRICAL UTILITIES

PART 1 – GENERAL

1.1 SCOPE

- A. This Specification describes the minimum acceptable standards for overhead distribution line construction. All construction work shall be done in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications, and the construction drawings.
- B. The staking sheets are included on the Drawings.
- C. Any modified RUS Construction Units or any new construction units are included on the detail sheets in the Drawings. Any standard RUS Construction Units referenced on the Drawings or staking sheets shall be obtained by the Contractor. The lack of having the correct RUS construction unit drawing will not be acceptable as an excuse for an incorrect installation.
- D. The Drawings and Specifications are complementary. What is shown on one is binding whether shown or specified in the other or not. Failure to check both the Drawings and the Specifications will not be grounds for a change order.

1.2 RELATED REQUIREMENTS

- A. Division 1.
- B. Section 26 05 00 – Common Work Results for Electrical.
- C. All other Division 33 Specifications.

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. ANSI-C2, National Electrical Safety Code – NESC.
 - 2. RUS Bulletin 1728F-804, Specifications and Drawings for 12.47/7.2 kV Line Construction, the Staking Sheets, Drawings and Specification, and Construction Drawings.

1.4 QUALITY CONTROL

- A. All material shall be Rural Utility Service (RUS) approved and accepted.
- B. All construction work shall be done in a thorough and workman-like manner in accordance with RUS Bulletin 1728F-804, Specifications and Drawings for 12.47/7.2 kV Line Construction, the Staking Sheets, Drawings and Specification, and Construction Drawings. The Contractor shall obtain a copy of these specifications and shall keep them on the jobsite.
- C. This Specification supplements the RUS Bulletins identified above. Where there is a conflict, the more stringent condition shall apply. In general, standard RUS construction unit drawings have been used. However, several construction units have been modified. These construction units are included on the Drawings and have been identified with a modifier and may be used in lieu of the similar RUS construction unit.
- D. Work shall be performed to the latest adopted Edition of the National Electric Safety Code (NESC) except where local regulations or the Specifications or Drawings are more stringent, in which case the Specifications and/or Drawings and the local regulations shall govern.

1.5 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 – Common Work Results for Electrical.

1.6 DISTRIBUTING POLES

- A. In distributing the poles, large, choice, close-grained poles shall be used for transformers, deadend, angle, and corner poles.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components.
- B. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacturer of the product.

2.2 INSULATORS

- A. Post or pin insulators shall be rated minimum 23 kV, polymer. Contractor shall determine neck size for the conductor provided.
- B. Suspension insulators shall be polymer, 25 kV, Hubbell PDI-25 or approved equal.
- C. Insulators, tension, pin, and spool, shall be polymer type. Insulators shall be selected to properly accommodate the armor rod installed on the conductor.
- D. All insulators shall be RUS approved.

2.3 CROSSARMS

- A. Crossarms shall meet the requirements of RUS Spec. No. DT-5B:PE-16 solid wood, distribution type, and a 1/4 inch, 45° chamfer on all top edges. Crossarms shall be full-length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute. Pressure treatment shall be by the Copper Naphthenate or pentachlorophenol process in accordance with AWWA C4. Other treatment processes will not be accepted.
- B. Crossarm gains shall meet ANSI C135.33 requirements.
- C. Crossarms shall be 8 feet in length, unless otherwise required by the Contract Documents. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment. Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators, and for four suspension insulators, except where otherwise indicated or required. Drilling shall provide required climbing space and wire clearances. Crossarms shall be straight and free of twists to within 1/10-inch per foot of length. Bend or twist shall be in one direction only. Crossarms shall have a stamp or nameplate indicating manufacturer, year of manufacture, species of wood, and type of treatment, and grade (close grain or dense).
- D. Crossarm braces shall be selected for the crossarm length and shall be full-length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute. Pressure treatment shall be by the Copper Naphthenate or pentachlorophenol process in accordance with AWWA C4. Other treatment processes will not be accepted.

2.4 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.
- B. Arresters shall be 7.65 kV, 9 kV duty cycle, distribution class, MOV type requiring no gap adjustment.
- C. Surge arresters shall be provided for protection of aerial-to-underground transitions, gang-operated load-interrupter switches, transformers and other indicated equipment.
- D. Surge arrestors shall meet NEMA LA1 requirements for the zinc-oxide type and shall be suitable for outdoor installations. Arresters shall be equipped with mounting brackets suitable for the indicated installations.
- E. Hubbell PDV-100 No. 213708, or approved equal.

2.5 POLE LINE HARDWARE

- A. Zinc-coated hardware material shall meet ANSI C135.1, C135.14, C135.17, C135.22, and C135.33 requirements.
- B. Steel hardware material shall meet ASTM A575 and A576 requirements.
- C. All hardware shall be hot-dip galvanized in accordance with ASTM A153.
- D. All curved washers shall be cast ductile iron.

2.6 GUY ASSEMBLIES

- A. Guy material shall be minimum 7 strands, 3/8" nominal diameter, Class A zinc-coated-steel high-strength meeting ASTM A475 requirements, with a minimum breaking strength not less than 10,800 pounds or as indicated on the Drawings.
- B. Guy assemblies, including insulators and attachments, shall provide a strength exceeding the required guy strength. Thimbles or thimble-eyes shall be provided on anchor points. Guy hook guy attachments shall be Hubbell catalog number GH5N, or approved equal.
- C. Holding capacities for down guys shall be based on a lead angle of 45 degrees as indicated. When field conditions prevent indicated lead angles, anchors shall be placed in other locations as approved by the Engineer.

- D. Guy deadends shall be made by using Preformed Line Products Guy-Grip deadend, or approved equal. Deadends shall be selected to equal or exceed the rating of the RUS unit referenced in the Staking Sheets.

2.7 GUY MARKERS

- A. Guy markers shall be full round, 2-inch by 8 feet long, yellow. Markers shall be made of high density polyethylene with ultra-violet light resistance additives to protect the resin and the color from brittleness and fading. Provide vandal resistant type. Securely clamped to the guy at the bottom and top of the marker.
- B. Install red striped reflective tape on both sides of the guy guard. Install in warm environment to allow for proper adhesion.

2.8 SPLICES AND DEADENDS

- A. All splices shall be full tension automatic type, Fargo GL406A or approved equal.
- B. Primary deadends shall be clamp type dead end shoe, Hubbell PG46N or approved equal. Deadends shall be full tension rated for the conductor.
- C. Secondary and service conductors shall be deadended using Preformed Line Products service grip deadends, suitable for the conductor provided.

2.9 POLE NUMBERS

- A. Pole numbers shall be 2-inch high aluminum embossed with Roman typeface. Attached to pole with aluminum barbed round head nail. Pole numbers shall match the associated location in the Staking Sheet.

2.10 PRIMARY OVERHEAD CONDUCTORS

- A. All primary conductors shall be overhead Aluminum Conductor Steel Reinforced (ACSR) type, #2, code word Sparate.

2.11 SUPPORT BRACKETS AND TRANSFORMER MOUNTS

- A. Support mounts for three-phase transformer installations shall be Aluma-form wing cluster mounts, model 3MW-24-M-L. Cluster mounts shall be suitable for the transformers installed.

PART 3 – EXECUTION

3.1 GENERAL

- A. Materials to be used for construction are designated by one or two lower-case alphabetic characters shown on the Drawings and in the "ITEM" column in the drawing material blocks. For example, "b" designates a steel, pole top pin.
- B. Normally crossarm pins and post-type insulators come equipped with washers and locknuts. Thus, the washers and locknuts for crossarm pins are not tallied in the "QTY" (quantity) columns in the material boxes on the Drawings. However, the crossarm pin washers and locknuts are shown on the Drawings in parenthesis to depict proper construction. If crossarm pins or post type insulators are purchased without washers, locknuts or studs, the quantity totals in the material boxes on the Drawings will need to be adjusted accordingly.
- C. Locknuts shall be installed on all threaded material and hardware in addition to nuts and washers. The threads on installed bolts shall protrude past the lock washers a minimum of one inch but not more than two inches.

3.2 SETTING POLES

- A. All poles shall be direct buried in accordance with RUS standards.
- B. On sloping ground, the depth of the hole shall be measured from the low side of the hole.
- C. Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two (2) poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.
- D. Poles shall be set in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line. Vertical angle structures (A3, B3, C3) shall be offset from centerline by the length of the insulator string hardware, to prevent adjacent poles from leaning into the angle.
- E. Poles shall be raked against the conductor strain not less than one inch for each ten feet of pole length, but not more than two inches for each ten feet of pole length after conductors are installed at the required tension.

- F. Pole backfill shall be thoroughly tamped the full depth. Excess dirt shall be banked around the pole.

3.3 OVERHEAD CONDUCTOR INSTALLATION

- A. Conductors shall be handled with care. Conductors shall not be tramped on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductors spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing.
- B. The neutral conductor should be maintained on one side of the pole for tangent construction and for angles not exceeding 30°.
- C. With pin-type insulators the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type insulators shall be tight on the pins and on tangent construction the top groove shall be in line with the conductors after tying in.
- D. For neutral and secondary conductors on poles, insulated brackets (Material Item 'da') may be substituted for the single and double upset bolts on angles of 0° to 5° in locations known to be subject to considerable conductor vibration. All conductors shall be cleaned thoroughly by wire brushing before splicing or the installation of a connector or clamp. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

3.4 SAGGING CONDUCTORS

- A. Conductors shall be sagged evenly and in accordance with the conductor manufacturers' recommendations.
- B. The sag of all conductors after stringing shall be in accordance with the conductor manufacturers' recommendations, except that a maximum increase of three (3) inches of the specified sag in any span will be acceptable. However, under no circumstances will a decrease in the specified sag be allowed.
- C. The conductor shall be tensioned above the initial sag conditions. After bringing conductor to proper sag, deadends shall be secured within 2 hours. Wire shall be tied to insulators within 48 hours.

3.5 CONDUCTOR TIES

- A. All ties used shall be pre-formed type as manufactured by Preformed Line Products and conductors shall be properly attached to insulators using preformed ties.

- B. Conductor ties shall be selected to properly accommodate the armor rod installed on the conductor.

3.6 GRADING OF LINE

- A. When using high poles to clear obstacles such as buildings, foreign wire crossing, railroads, etc., there shall be no upstrain on pin-type insulators in grading the line each way to lower poles.

3.7 GUYS AND ANCHORS

- A. Guys shall be placed before the conductors are strung and shall be attached to the pole per the Specifications for Overhead Distribution Line Construction.
- B. All anchors shall be as indicated on the Drawings and specified herein.
- C. Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the Drawings.
- D. All anchors and rods shall be in line with the strain and shall be so installed that approximately six inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above the earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.
- E. Guy bonding clamps shall be installed in the eyes of all anchor rods. All guys (primary & secondary) shall be effectively grounded according to REA/RUS specifications. On secondary poles, guys shall be bonded to the secondary neutral.

3.8 POLE LINE HARDWARE

- A. A locknut shall be installed with each nut, eye-nut, or other fastener on all bolts or threaded hardware such as insulator pins, upset bolts, double arming bolts, etc.
- B. Suitable washers shall be installed under bolt heads and nuts on wood surfaces and elsewhere as required. Washers used on through-bolts and double-arming bolts shall be approximately 2-1/4 inches square and 3/16 inch thick. The diameter of holes in washers shall be the correct standard size for the bolt on which a washer is used. Square curved washers shall be used for down-guy attachments to pole. Washers for use under heads of carriage-bolts shall be of the proper size to fit over square shanks of bolts. Eye bolts, bolt eyes, eyenuts, strain-load plates, lag screws, guy clamps, fasteners, hooks, shims, and clevises shall be used wherever required to adequately support and protect poles, brackets, crossarms, guy wires, and insulators.

- C. A 3 inch by 3 inch (minimum), square, curved washer (item "d") shall be used abutting the pole when installing primary deadend, neutral deadend and guy assemblies directly to the pole. A 2-¼ inch (minimum) square washer shall be placed under the shoulder of crossarm insulator pins whose surface area abutting the crossarm is less than 4 square inches.

3.9 SPLICES AND DEADENDS

- A. Conductors shall be spliced and deadended as indicated on the Drawings. There shall be not more than one (1) splice per conductor in any span and splicing sleeves shall be located at least ten (10) feet from the conductor support.
- B. No splices shall be located in grade B crossing spans nor in the adjacent spans.
- C. Splices shall be no closer than 1,000 feet from one another and there shall be no more than three splices per mile in any primary phase or neutral conductor.
- D. Splices shall be installed in accordance with the manufacturer's specifications and recommendations.

3.10 TAPS AND JUMPERS

- A. Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not indicated, it shall be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.
- B. All aluminum to aluminum connections shall be provided with a Belleville washer.
- C. Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the Drawings it will be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.
- D. All leads on equipment such as transformers, etc., shall be a minimum of #4 AWG bare, stranded copper conductors. No. 4 AWG stranded copper conductors shall be used from the primary line to a cutout and from the cutout to the transformer. Provide slack in the jumper to allow for movement in the conductors during windy conditions. Where aluminum jumpers are used, a connection to an unlapped bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a suitable aluminum compression sleeve.

- E. All primary jumpers shall consist of #2 ACSR, or the size of the conductor.
- F. Pole tap assemblies shall be framed so that the source is on top and the load (tap) is below.
- G. In no case shall pin-type insulators be installed upside down to carry jumpers.

3.11 HOT LINE CLAMPS AND CONNECTORS

- A. Connectors and hot-line clamps suitable for the purpose shall be installed. On all hot-line clamp installations, the clamp and jumper shall be installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected.
- B. Hot-line clamps shall be used at single phase transformer connections beneath three-phase primary lines and where single phase primary taps or extends from a three-phase primary line. Where a hot line clamp is used install a stirrup clamp suitable for the conductor.
- C. Stirrups shall be aluminum, bolted with tin plated loop. Hubbell Power type AHLS, or approved equal. Size selected to fit the primary conductor and the hot line clamp.
- D. Connections to the main line shall be made with compression solderless connectors. Connectors to equipment shall be made with compression connectors bolted to the equipment pad. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire. Where ground wires are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be utilized.
- E. All conductors shall be cleaned thoroughly by wire brushing before splicing or installing connectors or clamps. A suitable oxidation inhibitor shall be applied before splicing or applying connectors over aluminum conductor.
- F. All insulated secondary to secondary connections shall be made using compression connectors which are already pre-insulated, or parallel groove connectors and plastic covers.
- G. Secondary connections at the polemount transformers shall be made up as indicated on the Drawings. Inhibitor compound shall be used in all mechanical (setscrew) connections.

3.12 ARMOR RODS

- A. Armor rods shall be provided for all ACSR conductors. Armor rods shall be installed at each insulator but will not be required at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used.
- B. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. All armor rods shall be pre-formed round.
- C. The application of armor rods to the conductor shall be such that the center of the armor rods shall not deviate from the center of the conductor support by more than 2-1/2 inches.

3.13 TRANSFORMERS

- A. Polemount transformers shall be installed and grounded according to REA/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. Transformers internally wired for 120 Volt secondary shall be labeled "120V" with reflective tags, 2.5" minimum height.

3.14 CROSSARMS

- A. Crossarms shall be bolted to poles with 5/8-inch through-bolts with square washer with locknut at each end. Bolts shall extend not less than 1/8 inch nor more than 2 inches beyond nuts.
- B. On single crossarm construction, the bolt head shall be installed on the crossarm side of the pole. Single crossarms shall be placed on opposite sides of consecutive poles.
- C. Double crossarms shall be securely held in position as indicated on the RUS Construction Units. Each bolt shall be equipped with square washers with locknuts. Double crossarms shall be provided at dead-ends, and at angles and corners as indicated, to provide adequate vertical and longitudinal strength.
- D. Tangent Arms and Buck Arms: Tangent arms and buck arms shall be set at right angles to lines for straight runs and for angles 45° and greater. Tangent arms shall bisect angles of turns of less than 45°. Dead-end assemblies shall be used for turns where shown. Buckarms shall be installed, as indicated, at corners and junction poles.

3.15 BRACES

- A. Wood braces shall be used for crossarm supports, unless specified otherwise on the Drawings. Braces shall be Hughes Brothers type 2023 or 2045, size as indicated on the RUS Construction Units, or approved equal.
- B. Braces shall be bolted to arms with 3/8-inch carriage bolts with round or square washers with locknuts between boltheads and crossarms, and secured to poles with 1/2-inch by 4-inch lag screws after crossarms are leveled and aligned.

3.16 GROUNDING

- A. The ground wire shall be secured to the pole with copper coated staples. The staples on the ground wire shall be spaced two (2) feet apart except for a distance of eight (8) feet above the ground and eight (8) feet down from the top of the pole where they shall be six (6) inches apart.
- B. Poles with pile foundations shall utilize the pile foundations in place of a ground rod. All poles shall be bonded to the pile, see construction unit for details.
- C. Ground rods shall be driven full length in undisturbed earth in accordance with the Drawings. The top shall be at least 12 inches below the surface of the earth.
- D. All below grade connections shall be made using the exothermic weld metal method.
- E. All equipment shall have at least two (2) connections from the frame, case or tank to the multi-grounded neutral conductor.
- F. The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.
- G. Ground wire sizes shall be not smaller than No. 4 AWG copper. All pole grounds shall be solid.
- H. Surge Arrester Grounding: Surge arresters shall be grounded. Ground resistance for distribution-class arresters shall be not more than 5 ohms. Ground wire connections shall be not less than #4 AWG for distribution arresters.
- I. Unless otherwise indicated, neutral conductors shall be grounded at each transformer. Also, neutral conductors shall be grounded at a point not exceeding every third pole.

3.17 WOOD POLE STORAGE AND HANDLING

- A. Wood poles held in storage for more than 2 weeks shall be stored in accordance with ANSI 05.1. Poles shall be stacked on treated skids, so arranged as to support the poles without producing noticeable distortion to any of the poles and to allow free circulation of air. The height of the piles shall be limited so as to avoid damage to poles on the bottom layers. Poles shall be piled and supported in such a manner that all poles are at least 1 foot above general ground level and any vegetation growing thereon. No decayed or decaying wood shall be permitted to remain underneath stored poles.
- B. Handling of wood poles shall be in accordance with ANSI 05.1. Poles shall not be dragged along the ground. Cant hooks, pole tongs, or other tools capable of producing indentations of more than 1 inch in depth shall not be used in handling the poles.

3.18 TESTS

- A. Operating Test: After the installation is completed, the Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with the requirements herein. Tests shall be performed in the presence of the Authority or the Authority Representative. The Authority shall be notified no less than 7-days prior to test date. The Contractor shall furnish field transportation, instruments, power, tools and personnel required for the test.
- B. Ground-Resistance Measurements: Ground-resistance measurements shall be taken and certified by the Contractor. Certified test results shall be submitted to the Authority no less than 5-days prior to energization of the distribution system. No part of the electrical distribution system shall be energized prior to the receipt of written approval from the Authority of the resistance testing of that system's ground rods and grounding systems. Test reports shall indicate the location of the ground point and grounding system and the resistance and the soil conditions at the time the test was performed. When the building water service is used as a ground or part of the grounding system, ground-resistance measurements shall also be made of this connection. Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds. The resistance to ground shall be measured using the fall-of-potential method described in IEEE No. 142.

C. Sag and Tension Test:

1. The Authority shall be given no less than 7-days prior notice of the time schedule for stringing conductors or cables serving overhead medium-voltage circuits and reserves the right to witness the procedures used for ascertaining that initial stringing sags and tensions are in compliance with requirements for the applicable loading district and cable weight.
2. The Contractor shall submit the sag and tension method to be used and the sag tables used to achieve the proper sag. The Contractor shall wait a minimum of 2 hours after stringing the conductors to allow the conductors to stabilize prior to conducting the sag and tension tests. The Contractor must complete the tests within 36 hours after stringing the conductors to avoid damaging the cable. Sagging operations shall not be conducted when wind conditions prevents satisfactory sagging.
3. The span used to set the sag shall be called the sag-check span. The sag-check span shall be a level span and approximately equal to the ruling span.

END OF SECTION

SECTION 33 71 00.20
UNDERGROUND ELECTRICAL UTILITIES

PART 1 – GENERAL

1.1 SCOPE

- A. This Specification provides for the construction of underground distribution power facilities using cable-in-conduit. All construction work shall be done in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications, and the construction drawings.
- B. The staking sheets are included on the Drawings.
- C. Any modified RUS Construction Units or any new construction units shall be included on the Drawings. Any standard RUS Construction Units referenced on the Drawings or staking sheets shall be obtained by the Contractor.
- D. The Drawings and specifications are complementary. What is shown on one is binding whether shown or specified in the other or not. Failure to verify the Drawings and the Specifications will not be grounds for a change order.

1.2 RELATED REQUIREMENTS

- A. Division 1 Specifications.
- B. Division 26 Specifications.
- C. Division 31 Specifications.
- D. Division 33 Specifications.

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. ANSI-C2, National Electrical Safety Code – NESC.
 - 2. RUS Bulletin 1728F-806, Specifications and Drawings for Underground Electric Distribution, the Staking Sheets, Drawings and Specification, and Construction Drawings.

1.4 QUALITY CONTROL

- A. All material shall be Rural Utility Service (RUS) approved and accepted.
- B. All construction work shall be done in a thorough and workman-like manner in accordance with RUS Bulletin 1728F-806, Specifications and Drawings for Underground Electric Distribution, the Staking Sheets, Drawings and Specifications, and Construction Drawings. The Contractor shall obtain a copy of these specifications and shall keep them on the jobsite at all times.
- C. This Specification supplements the RUS Bulletins identified above. Where there is a conflict, the more stringent condition shall apply. In general, standard RUS construction unit drawings shall be used. Modified construction units may be included on the Drawings and be identified with a modifier.
- D. Work shall be performed to the latest adopted Edition of the National Electric Safety Code (NESC) and RUS bulletins, except where local regulations or the Specifications or Drawings are more stringent, in which case the more stringent requirement shall govern.

1.5 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 – Common Work Results for Electrical.

1.6 INSPECTION AND INVENTORY OF BURIED UNITS

- A. Before any backfilling operations are begun, the Contractor and electric utility, or the Authority, shall jointly inspect all trenches, cable placement, pedestals, and other construction not accessible after backfill and an inventory of units shall be taken. If corrections are required, a second inspection shall be made after completion of the changes.

1.7 STORAGE OF MATERIAL AND EQUIPMENT

- A. All material and equipment to be used in construction shall be stored so as to be protected from deteriorating effects of the elements. If outdoor storage cannot be avoided, the material and equipment shall be stacked on supports well above the ground line and protected from the elements an appropriate, and with due regard to public safety.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components.
- B. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacturer of the product.

2.2 PRIMARY LOAD BREAK TERMINATIONS

Primary cable terminations in sectionalizing cabinets, transformers, and other pad mounted equipment shall be made using 200 amp load break separable connectors meeting the following requirements. The primary separable connectors shall be an assembly of load break elbows, load break feed through inserts, load break junctions, insulated standoff bushings, and load break protective caps.

- A. Meets the latest editions of the following standards:
 - 1. IEEE Std 386 standard for Separable Connectors.
 - 2. IEEE Std 404 standard for Cable Joints and Splices
 - 3. ANSI C119.4 Standard for Copper and Aluminum Conductor Connectors.
 - 4. AEIC CS5, CS6 and CS8 Standards for EPR Insulated Cables.
 - 5. ICEA S-94-649 Standard for EPR Insulated Cables
- B. Has the following voltage ratings and characteristics:
 - 1. Standard Voltage Class: 15 kV.
 - 2. Maximum Phase to Ground: 8.7 kV.
 - 3. AC 60 Hz 1 Minute Withstand: 35 kV.
 - 4. BIL and Full Wave Crest: 110 kV.
 - 5. Continuous current rating of 200 amps.
- C. Load break elbows shall be provided with a sheath seal to seal the junction between the cable and the load break elbow. Provide either a 3M Sheath Seal Kit 5831 or an integral jacket seal.
- D. Load break junctions shall be provided with U-straps.

- E. Load break elbows shall be provided with a test point and hold down bail.
- F. Insulated standoff bushings shall be provided with a stainless steel bracket.

2.3 PRIMARY SECTIONALIZING CABINETS

Sectionalizing cabinets shall be of fiberglass construction and shall meet the following requirements.

- A. Three-phase as required for the installation.
- B. Dimensions as follows:
 - 1. Three-phase cabinet shall be Nordic Fiberglass ND-552454 or approved equal with 18" Extension.
- C. Lid shall open wide to allow easy access to junctions from the top and sides.
- D. Direct burial type incorporating a wide base flange.
- E. Produced from fire-retardant resin and a combination of chopped glass spray-up and hand lay-up using woven roving glass reinforcement.
- F. All hardware shall be stainless steel. Provide stainless steel or silicon bronze penta-head bolt. Provide provisions for pad locking.
- G. Extra heavy duty fiberglass construction. Provide a combination of chopped glass spray-up and hand lay-up woven roving glass reinforcement. Provide a smooth exterior finish with marine grade gel coat. Provide external ribs molded into the front, back and sides to provide side-wall strength.
- H. Mounting plates shall be stainless steel. Three-phase cabinets shall be provided with mounting plates to accommodate up to three 4-point 15 kV load break junctions with U-straps and shall be provided with six stainless steel parking stands above the mounting plates.
- I. Provide 3/8" solid copper grounding system.
- J. The exterior shall be covered with Willow green gel-coat, containing UV stabilizer, and providing superior weather-ability and resistance to ultraviolet attack.
- K. Meet ANSI C57.12.28 Pad-Mounted Enclosure Integrity Standard.

2.4 PRIMARY CABLE IN CONDUIT

All medium voltage primary conductors shall be installed in conduit as indicated on the Drawings. All medium voltage primary conductors shall meet the following requirements:

- A. Voltage Rating: 15 kV.
- B. Medium voltage cable shall be suitable for primary underground distribution systems, direct buried or installed in underground ducts or conduits.
- C. Conductor temperature Ratings:
 - 1. Continuous Operation: 105°C.
 - 2. Emergency Operation: 140°C.
 - 3. Short Circuit Rating: 250°C.
- D. Cable shall have both conductor and insulation shielding and shall have a polyethylene jacket. Cable shall conform to NEMA WC8 for ethylene-propylene-rubber insulation. The year of manufacture shall be durably marked on the outer surface of each cable at regular intervals throughout the cable length.
- E. Conductor: Concentric-lay, strand filled, compressed bare aluminum, Class B stranded.
- F. Strand Fill: Provide water swellable powder that meets or exceeds ICEA T-31-610 water penetration resistance and ANSI/NEMA Class A connectorability requirements.
- G. Strand Screen: Extruded semi-conducting ethylene-propylene rubber.
- H. Insulation: Ethylene-propylene rubber, 133 percent, not less than 220 mils average thickness.
- I. Insulation Screen: Extruded semi-conducting ethylene-propylene rubber.
- J. Concentric bare copper strands to form a fully rated concentric neutral installed over the insulation screen.
- K. Encapsulating Jacket: Non-conducting linear polyethylene, with extruded red stripes, that meets the requirement of ICEA. Red stripes shall be spaced 120° apart. Provide NESC required lightning bolt.
- L. Factory Tests: Cable shall conform to the requirements of NEMA WC8 and AEIC CS6, constructed in accordance with RUS U-1.

- M. Owner furnished primary cable: Medium voltage cable meeting the requirements of this Specification is available on site in Port Heiden for use in this project in accordance with Specification 01 64 00 - Receipt of Owner Furnished Materials. All requirements for installation apply.
- N. Cable in conduit: Install single conductor in 2 inch diameter Schedule 40 HDPE conduit:
 - 1. Red extruded stripes and NESC lightning bolt.
 - 2. Wall thickness in accordance with NEMA TC7.
 - 3. Material in accordance with ASTM D 3350.
 - 4. Dimensions in accordance with ASTM D 3485.
 - 5. Manufactured in accordance with ASTM F 2160.

2.5 SECONDARY URD CABLE

All secondary conductors shall be installed in conduit as indicated on the Drawings. All secondary conductors shall meet the following requirements:

- A. All secondary underground residential distribution conductors shall be a cable assembly for underground service, aluminum, 600 volt, cross-linked polyethylene insulated conductors meeting the requirements of ANSI/ICEA S-81-570. Conductors shall be rated 90°C continuous operation, 130°C emergency overload, and 250°C short circuit rated. URD cable shall be installed in duct.
- B. Conductors shall conform to the following standards.
 - 1. B-231 Aluminum 1350 Conductors, Concentric-Lay-Stranded.
 - 2. B-609 Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes.
 - 3. B-786 19 Wire Combination Unilay-Stranded Aluminum Conductors for Subsequent Insulation.
 - 4. B-901 Compressed Round Stranded Aluminum Conductors Using Single Input Wire.
 - 5. ICEA S-81-570
 - 6. UL Standard 854 for USE-2.
- C. Conductors shall be stranded, compressed 1350-H16/H26 aluminum. Neutrals shall triple yellow extruded stripe.
- D. Cables shall be provided with "YES" neutrals and shall have sequential footage markers. Conductors shall be durably surface printed for identification.

- E. Each multiplex cable shall be provided in the sizes indicated in the Staking Sheets or on the Drawings. Cables shall be provided based on the standard Code Word for the specific cable. Cables shall be provided as follows:
1. Duplex Conductors:
Cables utilized for lighting or other 120 volt service. Cable shall consist of two insulated conductors, one of which shall be the neutral.
 2. Triplex Conductors:
Cables utilized for single phase service or other uses as indicated on the Drawings. Cable shall consist of three insulated conductors, one of which shall be the neutral. Conductors shall be marked for easy phase identification.
 3. Quadruplex Conductors:
Primarily used for three-phase service. Cable shall consist of four insulated conductors, one of which shall be the neutral. Conductors shall be marked for easy phase identification.
- F. Cable in conduit: Install multiplex conductor in Schedule 40 HDPE conduit:
1. Red extruded stripes and NESC lightning bolt.
 2. Wall thickness in accordance with NEMA TC7.
 3. Material in accordance with ASTM D 3350.
 4. Dimensions in accordance with ASTM D 3485.
 5. Manufactured in accordance with ASTM F 2160.
 6. Install triplex and quadruplex cables in 2 inch conduit. Duplex conductors may be installed in 1-1/4 inch conduit.

2.6 SECONDARY CABLE TERMINATIONS

- A. Secondary cable terminations at transformers shall be Thomas & Betts Homac insulated in-line connector, Type EZC, or approved equal. Provide 4, 6, or 8 outlets as required for the services on the transformer.

2.7 BURIED CABLE MARKING TAPE

- A. Buried cable marking tape shall meet the following requirements:
1. 5 mil thick.
 2. Six inches wide.
 3. Detectable Aluminum core.

4. Permanently printed A.P.W.A uniform color coded.
5. Red – “CAUTION BURIED ELECTRIC LINE BELOW.”

2.8 PAD MOUNT TRANSFORMERS

- A. Pad mount transformers will be Owner furnished in accordance with Specification 01 64 00 – Receipt of Owner Furnished Materials.

2.9 TRANSFORMER GROUND SLEEVES

- A. Ground sleeves for pad mount transformers will be Owner furnished in accordance with Specification 01 64 00 - Receipt of Owner Furnished Materials.

PART 3 - EXECUTION

3.1 GENERAL

- A. Materials to be used for construction will be designated by one or two lower-case alphabetic characters shown on the Drawings and in the “ITEM” column in the drawing material blocks. For example, “Uhp” designates an elbow termination.

3.2 TRANSFORMER INSTALLATION

- A. Transformers shall be handled carefully to avoid damage to the finish and shall be positioned in accordance with the staking sheets and the plans and specifications. Only qualified and experienced personnel shall be allowed to make connections and cable terminations.

3.3 HANDLING OF CABLE

- A. Cable shall be handled carefully at all times to avoid damage, and shall not be dragged across the ground, fences or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The ends of the cable shall be sealed at all times against moisture with suitable end caps. Where it is necessary to cut the cable, the ends shall be terminated and or sealed immediately after the cutting operation.

3.4 EQUIPMENT PADS

- A. The site for equipment pads shall be on undisturbed earth adjacent to but not over the trench. The site shall be cleared of all debris and excavated to the specified depth. Gravel, sand or other acceptable self-draining material shall be added to the site and thoroughly compacted.

3.5 EQUIPMENT ENCLOSURES

- A. Excavations for sectionalizing cabinets and transformer ground sleeves shall be made so as to disturb the surrounding earth as little as practical. Enclosures shall be installed with side walls plumb. When ground sleeves are of fiber, plastic, or other semi flexible material, backfilling shall be done with covers in place and with careful tamping so as to avoid distortion of the enclosure. When installation is complete, the cover of the enclosure shall not be lower than and not more than two inches higher than the grade specified by the Owner. Soil in the immediate vicinity shall be tamped and sloped away from the enclosure. The excess soil shall be removed from the site or spread evenly over the surface of the ground to the satisfaction of the Owner.

3.6 INSTALLATION OF SECTIONALIZING CABINETS

- A. Install cabinets in accordance with the manufacturer's instructions and the requirements of RUS specifications.
- B. Provide a cabinet extension as required for areas where there will be higher than normal snow buildup.
- C. Ground cabinets in accordance with RUS specifications.
- D. Install a 72" spring loaded cabinet marker to identify the cabinet location in areas.
- E. Install four point load break junctions on each mounting plate.
- F. All unused junction bushings and standoff bushings shall be provided with a load break protection cap.
- G. Primary cables in three-phase sectionalizing cabinets shall be installed with A-phase on the left, B-phase center, and C-phase on the right, facing the sectionalizing cabinet.
- H. At each three-phase sectionalizing cabinet, each 4-point junction shall be identified using 2" high, self-adhesive letters attached to the enclosure above the junction point. Letters shall be white with an orange background.

3.7 TRENCHING

- A. All trenching depths specified are minimum as measured from the final grade to the top surface of the cable. The routing shall be as shown on the staking sheets and plans and specifications unless conditions encountered are such that changes are necessary to accomplish the work. In such event, the Owner shall be notified promptly. If rock or other difficult digging is involved, the Contractor shall

determine the nature and extent of the difficulty, and the Owner will determine whether rerouting, rock trenching, plowing or other changes are necessary. Loose soil or crumbly rock will not be considered as "difficult digging." The trench widths specified are minimum and should be increased as necessary to obtain the required depths in loose soils.

- B. Where trenches are intended for more than one cable, particular care must be taken to provide for extra depth and width to allow for soil falling into the trench during the laying of the first cables.
- C. Care shall be exercised to minimize the likelihood of water flow since this may cause trench damage and reduction in trench depth. When this occurs, the trench must be cleared to the specified depth before installing the cable.
- D. All trenches shall follow straight lines between staked points as far as possible. Secondary and service trenches shall extend in a straight line from takeoff points wherever possible. The trenches shall be dug so that the bottom has a smooth grade. Large rocks, stones and gravel in excess of one inch shall be removed from the bottom of the trench. Where this cannot be done, a two-inch bed of sand or clean soil shall be placed in the bottom of the trench.
- E. Construction shall be arranged so that trenches will be left open for the shortest practical time to avoid creating a hazard to the public and to minimize the likelihood of trench collapse due to other construction activity, rain, accumulation of water in the trench, etc.
- F. Install buried cable marking tape as required by the RUS construction units.

3.8 BACKFILLING

- A. The first six inches of trench backfill shall be free from rock, gravel or other material which might damage the cable jacket. Soil backfill when used shall contain no solid material larger than one inch. This soil layer shall be carefully compacted so that the cable will not be damaged.
- B. Backfilling shall be completed in such a manner that voids will be minimized. Excess soil shall be piled on top and shall be well tamped. All rock and debris shall be removed from the site, and any damage to the premises repaired immediately.
- C. Pieces of scrap cable shall not be buried in the trench as a means of disposal.

3.9 INSTALLING CABLE

- A. The cable shall be placed in the trench as soon after the trenching operation as feasible. Wherever possible, cable shall be played out from the reel mounted on a moving vehicle or trailer. The reel shall be supported so that it can turn easily without undue strain on the cable. The cable shall be carefully placed in the trench by hand. All cable placement shall be done under constant supervision to be certain that no damage to the cable occurs.
- B. The cable shall be inspected carefully by the Contractor as it is removed from the reel in laying operations to be certain that it is free from visible defects. The Authority shall decide upon corrective action when defects are discovered.
- C. Cable shall be handled carefully at all times to avoid damage, and shall not be dragged across the ground, fences or sharp projections. Care shall be exercised to avoid excessive bending of the cable.
- D. Primary cable installed but which will not be terminated within 48 hours shall be sealed using heat shrink or cold shrink end caps. All sealed ends shall be impervious to water penetration.
- E. The minimum bending radius of primary cable is 12 times the overall diameter of the cable. The minimum bending radius of secondary and service cable is six times the overall diameter of the cable. In all cases the minimum radius specified is measured to the surface of the cable on the inside of the bend. No cable bends shall be made within 6.0 inches, of a cable terminal base.
- F. Where more than one cable is to be placed in a trench, the spacing required by the specifications shall be observed. Care shall be taken that any soil falling into the trench during the laying of the first cables does not reduce the clearances of the last, cable below that specified. Should this occur the excess soil must be removed carefully by hand or with equipment that will not damage the installed cables.
- G. Sufficient slack and in no case less than 24 inches shall be left at all transformer pads and terminal points so that movements of cable after backfilling will not cause damaging strain on the cable or terminals. Provide cable loops as indicated at sectionalizing pedestals.
- H. The cable trench shall be compacted 3' 0" minimum from all pads, pedestals and terminal points.

3.10 CABLE FIELD INSTALLED IN HDPE CONDUIT

Primary and secondary cable may be field installed in 2" HDPE conduit at Contractor's option. All field installation shall meet the following requirements:

- A. All cables installed in conduits shall be lubricated prior to pulling with an approved pulling lubricant which is compatible with cable materials. Lubricant shall be slow drying and its dried residue shall be nonconductive and noncombustible. Polywater Type J, or approved equal.
- B. Lubricants with a wax-based formula, such as "Yellow 77" or similar product, are not an acceptable lubricant and shall not be used.
- C. Cables shall be pulled through conduits using a rotational eye swivel, which shall be separate from the means of cable attachment.

3.11 PRIMARY CABLE TERMINATION

- A. All primary cable terminations at sectionalizing cabinets and transformers shall be made using prefabricated load break elbows installed in accordance with the manufacturer's instructions.
- B. Terminations shall be suitable for the size and type of cable that they are used with and for the environment in which they will operate. Any indication of misfit, such as a loose or exceptionally tight fit, shall be called to the Owner's attention. The outer conductive surface of the termination shall be bonded to the system neutral.
- C. Load break elbows shall be installed in accordance with the manufacturer's instructions.
- D. The cable shield shall be grounded in accordance with the manufacturer's instructions. Provide jacket seal around the ground braid or shield.
- E. A portable covering or shelter shall be available for use when terminations are being prepared and when prefabricated terminations are being switched. The shelter shall be used as necessary to keep rain, snow and windblown dust off the insulating surfaces of these devices. Since cleanliness is essential in the preparation and installation of primary cable fittings, care shall be exercised to prevent the transfer of conducting particles from the hands to insulating surfaces. Mating surfaces shall be wiped with a solvent such as denatured alcohol to remove any possible accumulation of dirt, moisture or other conducting materials. A silicone grease should be applied afterwards in accordance with the manufacturer's recommendations. Whenever prefabricated cable devices are opened, the unenergized mating surfaces shall be lubricated with silicone grease before the fittings are reconnected.

3.12 CABLE SPLICING

- A. New cables shall not be spliced. Splices shall only be installed in existing cables where indicated or required. All splices shall be approved by the Authority.

3.13 SECONDARY CABLE TERMINATION

- A. A suitable inhibiting compound shall be used with all secondary and service connections.
- B. All secondary cable connections installed in secondary pedestals shall be made with preinsulated secondary connector blocks. Diving bells with open terminals, insulating boots or moisture barriers that depend solely on tape are not acceptable.
- C. All transformer secondary phase terminal connections shall be completely insulated. The secondary phase terminals, threaded studs, shall be made with a preinsulated secondary transformer connection block.
- D. The secondary connections and insulation shall have accommodations for all future and existing services as shown on the plans and specifications.

3.14 IDENTIFYING CABLES AT TERMINATION POINT

- A. As the cables are laid they shall be identified and tagged. The identification shall be of a permanent type, such as that done with an embossing type tape writer on plastic or corrosion resistant metal tags. The tag shall be securely attached to the cable with stainless steel strap. Paper or cloth tags are not acceptable. Hand marking or lettering is not acceptable.
- B. All tags shall be easily visible without moving the cable or any other piece of equipment or item.
- C. Primary cables shall be identified with the origination of the circuit and the phase.
- D. Any temporary tag used during construction shall be removed and a permanent tag shall be installed prior to substantial completion.
- E. In addition to other identification, each primary conductor, both new and existing, shall be identified by phase using Scotch 35 marking tape. Provide a minimum of 3-inches of tape at each accessible location. Color identification shall be as follows:
 - 1. Phase A: Red.
 - 2. Phase B: White.
 - 3. Phase C: Blue.

- F. Secondary service conductors shall be identified at each transformer secondary compartment and at each secondary pedestal. Identification shall consist of the name of the service, or other method that clearly identifies each service, as directed by the electric utility.

3.15 SECONDARY PEDESTALS

- A. All secondary pedestals shall be approximately at the same height above finished grade.

3.16 GROUNDING

- A. All neutral conductors, ground electrodes, and groundable parts of equipment shall be interconnected. All interconnections shall be made as shown on the construction drawings or required for a complete and safe system. A copperclad ground rod shall be installed at all equipment locations as shown in the construction drawings. At a minimum, ground rods shall be installed at each sectionalizing cabinet and other equipment as required by RUS specifications and drawings.
- B. The equipment ground, neutral wires, and lightning-protective equipment shall be interconnected and attached to a common ground wire.
- C. Ground wire sizes, not otherwise indicated, shall be not smaller than No. 4 AWG.
- D. Unless otherwise indicated, the concentric shield shall be grounded at each sectionalizing cabinet.

3.17 WARNING SIGNS

- A. Each sectionalizing and equipment enclosure shall display a warning sign placed so that it is visible to anyone attempting entry into the enclosure.
- B. Provide signs as required by RUS Unit UM33

END OF SECTION

SECTION 33 71 16
ELECTRICAL UTILITY POLES

PART 1 – GENERAL

1.1 SCOPE

- A. This Specification describes the minimum acceptable quality of wood poles. Where there is conflict between this Specification and any other specification referred to herein, this Specification shall govern. The poles shall be constructed in accordance with these Specifications.

1.2 RELATED REQUIREMENT

- A. Section 33 71 00 – Electrical Utilities.

1.3 STANDARDS

- A. All characteristics, definitions, and terminology, except as specifically covered in this Specification, shall be in accordance with the latest revision of the following standards.
 - RUS Bulletin 1728F-700: Specification for Wood Poles, Stubs, and Anchor Logs.
 - ANSI 05.1: Wood Poles – Specifications and Dimensions.
 - AWPA-C4: Poles – Preservative Treatment by Pressure Processes, American Wood Preservers Association.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 – Common Work Results for Electrical.

PART 2 – PRODUCTS

2.1 WOOD POLES

- A. Wood poles shall meet the requirements of ANSI 05.1 and shall be Douglas Fir drilled and gained in accordance with RUS W1.1G Pole Framing Guide. Wood poles shall have pole markings located 10 feet from pole butts. Other locations will not be acceptable. Poles shall be machine trimmed by turning smooth full length, and shall be roofed, gained, and bored prior to pressure treatment. No climbing rungs shall be provided.

- B. Poles shall be full length pressure treated using a pressure injection method approved by the Western Wood Preserves Institute that prevents leaching. Pressure treatment shall be by the Copper Naphthenate or pentachlorophenol process in accordance with AWWA C4. Other treatment processes will not be accepted.
- C. Poles exhibiting any of the following defects will not be accepted; cross-breaks (horizontal cracks), catface (scars), compound through checks, decay, double sweep (poles having sweep in two planes), hollow butts or tops, improper framing, plugged holes (other than increment core holes), spike knots or any knot with bark inclusion, and split top.
- D. Checks:
 - 1. Checks (vertical cracks) are permitted in the top of pole except for any check more than 1/8 inch wide and extending down from the top of the pole more than 12 inches and within 30 angular degrees from the axis of the face of pole directly above ground; and any through checks or splits.
 - 2. Through checks or splits in the butt surface of the pole are not permitted.
 - 3. A check is considered to be continuous if it is not separated by at least 1/2 inch of wood. The maximum allowable width and length of any single check are found in Table II "Maximum Allowable Check Dimensions".

TABLE II. MAXIMUM ALLOWABLE CHECK DIMENSIONS

LENGTH OF POLE	MAXIMUM WIDTH	MAXIMUM LENGTH
30 feet	1/4 inch	5 inches
35 and 45 feet	5/16 inch	5 inches
50 feet and longer	3/8 inch	8 inches

- E. Knots:
 - 1. The diameter of any single knot or sum of the diameters of all knots shall not exceed the limits of Table II "Limits of Knot Sizes".

PART 3 – EXECUTION

3.1 CERTIFICATION

- A. Provide a certificate of compliance, signed by an authorized employee of the producer, that the material shipped meets the requirements of this Specification and any supplementary requirements cited in a contract or order under which it was purchased.
- B. Provide independent inspection certification.

END OF SECTION

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SECTION 33 72 16.10
POLE MOUNTED 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 ANSI Standards C57.12.26 and C57.12.00, except as modified herein.
- B. Transformers shall be designed in accordance with RUS requirements and shall be of new construction.
- C. Transformers shall be suitable for step-down service or step-up service as indicated.
- D. Quantities and ratings shall be as indicated on the Drawings and staking sheets.

1.2 RELATED REQUIREMENTS

- A. Section 26 05 00 – Common Work Results for Electrical.
- B. Section 33 71 00 – Electrical Utilities.

1.3 STANDARDS

- A. 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.

- C57.12.90: IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers.
- C57.12.91: Guide for Loading Mineral-Oil-Immersed Overhead and Pad-Mounted Transformers rated 500 kVA and less with 55°C or 65°C average winding rise.
- NEMA TR-1: Transformers, Regulators, and Reactors.
- NEMA TP-1: Guide for Determining Energy Efficiency for Distribution Transformers.
- NEMA TP-3: Standard for Labeling of Distribution Transformer Efficiency.
- DOE: 10 CFR Part 431 – Department of Energy – Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data: Submit shop drawings and product data for the products of this section in compliance with Section 26 05 00 – Common Work Results for Electrical.
- B. Submit complete electrical data, mechanical and layout drawings, and wiring and connection diagrams for each type of transformer provided.
- C. Drawings shall indicate the kVA rating, dimensions, transformer impedance, voltage (both primary and secondary), phase of the transformer, and winding connecting.
- D. Provide certified test reports prior to shipment of the transformers. Test reports shall indicate the impedance, no load, and full load loss of each transformer, by serial number, and shall include the transformer efficiency, expressed in percent, of the transformer based on the test procedures specified herein.
- E. Certified test reports shall contain a statement identifying the amount of PCB in the insulating oil.

1.5 WARRANTY

- A. The failure of any transformer due to defective design, material and/or workmanship within 12 months after being energized or eighteen months after being delivered, whichever comes first, shall be repaired or replaced without cost. Any defect in design, material and/or construction discovered within this period shall be corrected at the manufacturer's expense, either by repair or replacement.

PART 2 – PRODUCTS

2.1 RATINGS

A. General:

1. Primary Voltage Rating: 12470/7200 volt, grounded wye.
2. Secondary Voltage Rating: As indicated on the staking sheets.
3. Frequency: 60 Hz.
4. Phase: Single.
5. Impedance: 1% ± 5%.
6. kVA Rating: As indicated on the staking sheets.
7. BIL Rating: 7200/12470Y 95 kV.
8. Temperature Rating: Self-cooled, 65° C above a 30° C ambient.

2.2 ACCEPTABLE MANUFACTURERS

Acceptable manufactures shall be as follows. Manufacturers shall be on the RUS approved list.

- A. ABB.
- B. Cooper Power.
- C. Ermco.
- D. General Electric.
- E. Howard Transformers.
- F. Approved equal.

2.3 TRANSFORMER VOLTAGES

- A. Transformer primary voltage shall be 7,200 volts.
- B. Unless otherwise indicated on the Drawings or in the staking sheets, transformer secondary voltages shall be as follows:
 1. Transformers used for single-phase service shall be 120/240 volt.

2. Transformers used as part of a 120/208 three-phase transformer bank shall be rated 120 volts to provide utilization of the full transformer capacity for 120/208 volt, three-phase service.

2.4 TRANSFORMER LOSSES

- A. Transformer no load and load losses shall be provided with the transformer submittal and shall be guaranteed by the manufacturer. Transformer losses determined by the factory tests on the individual transformers shall be less than 10% greater than the guaranteed bid losses. No individual unit shall be shipped that exceeds guaranteed no load losses by more than 10%.

2.5 TRANSFORMER TAPS

- A. Transformers shall be furnished with full capacity high-voltage taps. The taps shall be $\pm 2 - 2\frac{1}{2}\%$ 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.

2.6 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".
- C. The color of the bushings shall match Light Gray Number 70, Munsell Notation 5BG7.0/0.4.
- D. High voltage bushings shall be porcelain.
- E. Provide high voltage bushings rated at 110 kV BIL.

2.7 LOW VOLTAGE 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. The bushing terminals shall be tin plated to accommodate both aluminum and copper conductors.
- C. Provide three bushings on 120/240 volt transformers.
- D. The internal secondary leads shall be permanently embossed with the letters A, B, C, and D per ANSI C57.12.00 and C57.12.20.

2.8 PROTECTION

- A. No overcurrent protection is required. Transformers shall be protected using external fused cutouts installed by others.

2.9 CORE AND COIL

- A. Windings shall be copper or aluminum. All windings shall meet the guaranteed temperature rise requirements.
- B. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum the transformer shall be filled with preheated filtered degassed insulating fluid. 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.

2.10 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 stainless steel. All hardware shall be stainless steel. A bronze nut shall also be provided to eliminate corrosion problems and avoid galling. Provide a visible cover ground.
 - G. Provide ground connections accepting #8 AWG solid to #2 AWG stranded. Provide a ground strap between the secondary neutral bushing and the transformer tank.
 - H. The tank shall include arrester mounting pads, grounding provisions, ANSI support lugs (hanger brackets) and lift lugs. Hanger brackets shall be single.
 - I. The tank color shall be ANSI 70 light gray.

2.11 INSULATING OIL

- A. 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.

2.12 NOISE

- A. Standard transformer sound level shall not exceed the values as calculated per the latest edition of NEMA Publication TR-1.

2.13 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.

- C. Transformers internally wired for 120 Volt secondary, for use on a 208/120 volt, three-phase bank, shall be labeled "120V" with reflective tags, 2.5" minimum height.

PART 3 – EXECUTION

3.1 TESTING AND LOSSES

- A. All units shall be tested for the following:
 - 1. No Load (Core) Losses.
 - 2. Load Losses at 85°C and rated current.
 - 3. Percent Impedance at 85°C and rated current.
 - 4. Excitation current (100% voltage) test.
 - 5. Winding resistance measurement tests.
 - 6. Ratio tests using all tap settings.
 - 7. Polarity and phase relation tests.
 - 8. Induced potential tests.
- B. The manufacturer shall provide certification for all design and other tests listed in Table 17 of ANSI C57.12.00, including verification that the design has passed Short Circuit Criteria per ANSI C57.12.00 and C57.12.90.
- C. One PDF copy of the factory certified test report of each test, in IEEE 1388 format, shall be delivered to the Engineer for review and acceptance prior to shipment of the transformers.

3.2 SHIPPING

- A. The transformers shall be packaged to protect them from damage during shipment, handling, and storage.

END OF SECTION

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January 4, 2017

1659158

Joe Daniels
UMIAQ, LLC
6700 Arctic Spur Road
Anchorage, AK 99518

**RE: GEOTECHNICAL FINDINGS AND RECOMMENDATIONS
CLARK'S POINT POWER PLANT PROJECT**

Joe:

Golder Associates Inc. (Golder) is pleased to present our geotechnical findings and engineering recommendations for proposed Clark's Point power generation module project. This effort was performed under the scope of services presented in our proposal submitted to you on June 8, 2016.

1.0 PROJECT UNDERSTANDING

The Alaska Energy Authority (AEA) is planning a power generation upgrade for the village of Clark's Point. The proposed upgrade will include a single modular power plant designed for barge transport and installation on a prepared foundation system. The module delivery and installation is planned for the 2017 summer season. The proposed upgrade will also include relocating an existing 6,000-gallon skid mounted fuel storage tank to the power plant site. The approximate deadload of the power plant module is 60,000 pounds. The approximate static load of the fuel tank is 65,000 pounds when filled with fuel.

The power plant module is expected to be approximately 42 feet by 14 feet as a single story unit. The module houses several 65 to 100 kW diesel piston prime mover generators and associated switch gear and controls. The fuel tank will be located on common fill pad external to the power generation module with flexible connection fuel supply and return pipelines. The proposed development also includes buried glycol heat recovery pipelines between the power plant and the existing school and community center.

The general location of Clark's Point is shown in Figure 1. The proposed site for the new power plant is immediately south Sagayak Avenue near the intersection with Third Street, Figure 2. The proposed site is approximately 230 feet south of the school and 220 feet east of the community center.

Our scope of services included advancing shallow test pits using a local backhoe and operator within or near the proposed power plant module and fuel tank footprints, logging each test pit and collecting disturbed but representative soil samples from the excavations for geotechnical laboratory testing. Based on field and laboratory results, geotechnical recommendations for site preparation, power plant module foundations and the at-grade fuel tank were developed.

UMIAQ is the prime consultant for the proposed development providing project management, civil engineering and site survey. Mr. Danny Graham, PE is providing structural engineering for the module foundations.



2.0 HISTORIC GEOTECHNICAL DATA REVIEW

Based on our in-house geotechnical data library, two geotechnical investigations have been completed near the proposed development:

- **R&M Consultants (1984) School Site:** R&M advanced 9 test pits at the proposed school site with 2 additional test pits along the planned utility easement east of the school site. The test pits at the school site were advanced 12- to 14-feet below ground surface at the time of the field effort (bgs). All test pits encountered similar subsurface conditions: 2- to 3-feet of surface organics overlying mineral silt to clayey silt to the test pit excavation depths. Several test pits at the proposed school site encountered increased sand and gravel content in the silt starting about 8 feet bgs. Field data indicated the mineral silt was stiff to hard with soil moisture contents around 25-percent (dry weight basis). Field pocket penetrometer values in the range of 2- to 4-tons per square foot were reported with field values generally increasing with depth. Groundwater or permafrost were not encountered in the test pits.
- **Duane Miller Associates (1999) School Site Bulk Fuel Storage:** Two test pits were advanced about 40- to 80-feet east of the existing school as part of a bulk fuel storage upgrade project. The test pits were advanced with a local backhoe to 10- to 14-feet bgs. Soil encountered in the test pits included a 1- to 3.5-foot thick surface organic mat overlying mineral silt to the base of the explorations. Field data indicated pocket penetrometer values in the range of 2 tons per square foot in the mineral silt about 5- to 7-feet bgs, generally similar to the R&M field findings. Groundwater or permafrost were not encountered in either test pit.

3.0 2016 FIELD INVESTIGATION

UMIAQ developed a preliminary site plan with the proposed fill pad, power plant and fuel tank locations. Statewide utility locate requests and pre-field test pit locations were developed by Golder based on this site plan. Golder geologist Jessa Karp was on site November 17, 2016 to coordinate the site final utility locates with village representatives, mark the test pit locations and conduct a brief site health and safety meeting with key personnel prior to commencing explorations. Test pit locations were field located based on UMIAQ's site plan and interpreted GPS location for the power plant module. There were no reported buried utility conflicts at the test pit locations. The approximate test pit locations are provided in Figure 3.

Test pit excavation was performed by local operator Mr. Henry Wassily. Two test pits were advanced with a local CAT 416C rubber tire backhoe. As each test pit was advanced, Ms. Karp maintained a field log of the encountered subsurface conditions including soil type, ground thermal states, and groundwater conditions. Disturbed, but representative soil samples were collected at select intervals from the excavator bucket to field classify soils. Representative soil samples were collected and visually classified according to the Unified Soil Classification system (USCS). Representative portions of the recovered soil samples were double sealed in polyethylene bags and shipped to Golder's Anchorage geotechnical laboratory. Upon completion of the field effort, both test pits were backfilled with excavated soils and tamp compacted with the backhoe bucket. Groundwater was not encountered nor anticipated within the exploration depths at this site.

Samples were collected from a local borrow source to determine the quality of the fill. The borrow source is located on the beach to the western side of Clark's Point, Figures 2 and 4. Reportedly, material is taken directly from the side of the bluffs and used as fill throughout the village without additional material processing.

4.0 LABORATORY ANALYSIS AND SUMMARY RESULTS

Recovered soil samples were transported Golder's geotechnical laboratory in Anchorage. In the laboratory, the samples were re-examined to visually confirm the field classifications with select representative samples tested for geotechnical index properties.

Soil index property testing included soil moisture content, grain size distribution, organic content by ignition and plasticity index testing. Results of this testing are presented in Appendix A Test Pit Logs and in Appendix B Laboratory Data. Laboratory testing followed the standards established by the ASTM International (ASTM).

In general, the surface organics had 16- to 17-percent organic matter by dry weight with moisture contents around 70-percent, also on a dry weight basis. The underlying mineral silt had a low organic content near the contact with the overlying organic layer. The mineral silt had soil moisture contents ranging from 25 to 53-percent of dry weight with soil moisture contents in the mineral silt decreasing with depth and diminishing organic content.

The mineral silt had a low Plasticity Index, about 2 thus the moisture content variance between the soil's liquid and plastic limit states is narrow. As such, the mineral silt should be considered moisture sensitive and minor changes in soil moisture content may significantly impact affect the geotechnical behavior of the mineral silt. Summary laboratory results are presented in Appendix B.

5.0 REGIONAL GEOLOGY AND SITE CONDITIONS

The community of Clark's Point lies approximately 14 miles south of Dillingham in the Nushagak-Bristol Bay Lowland physiographic province. The lowlands are underlain with glacial moraine and outwash deposits that are mantled with silt and peat. Local relief in the province ranges from sea level to roughly 250 feet mean sea level (msl). A small area of wind-blown sand and silt lies east of the Nushagak River.

The original community was built on the lower lying wetlands at the base of an approximately 120 foot tall bluff to the south. The bluff was created when the Nushagak River incised into the glacial deposits. Over time, new additions to the village are constructed on top of the bluff. The power plant site is located on the eastern end of the community, near the school and community center. The proposed power plant site is an undeveloped area adjacent to an existing gravel road. The proposed site slopes gradually to the south away from the existing road.

6.0 SUBSURFACE CONDITIONS

In general, soil conditions were consistent in both test pits advanced at this site. The surface 4- to 5-feet consisted of dark brown organic silt with some fibrous peat. The surface organics are underlain by a light brown mineral silt with some fine sand and low plasticity. The mineral silt changes color to a light gray with rust colored inclusions at approximately 6- to 7-feet bgs, probably deeper. The fine sand content encountered in the light brown silt decreased with depth to the bottom of the excavations. Groundwater was not observed in either test pit. Groundwater is not expected at this site unless it is perched on seasonal frost. Permafrost is not expected in this area. A summary of subsurface conditions is provided in the test pit logs in Appendix A.

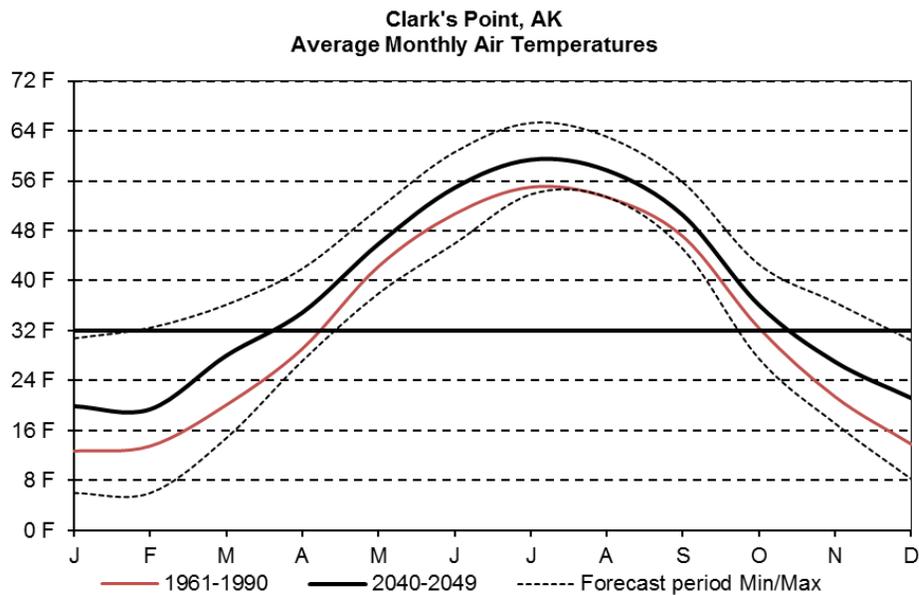
7.0 LOCAL BORROW MATERIAL

The local borrow site identified for this project was an in-place sand and gravel deposit along the base of the bluff near the village. This borrow is reportedly used throughout the village for roads, pads and load bearing under foundations. Based on our field grab samples, the material is a sand and gravel with low fines content (material passing the US Number 200 standard sieve size). Our field samples were collected from an inactive portion of the borrow site and may include some colluvium. Particle size distribution of the borrow material sample are provided in Appendix B.

8.0 CLIMATE DESIGN CONSIDERATIONS

We understand the structure is planned for a 30 year service life. Our geotechnical analysis is based, in part, on anticipated climate impacts in the area through 2040-2049. Forecast air temperature data and indices for the 2040-2049 period are summarized below. Climate, in particular average air temperature changes, are expected to continue to occur in the area. For our analysis, we have relied on monthly average air temperature forecast data developed by the University of Alaska, Scenarios Network for Alaska & Arctic Planning (SNAP). The SNAP group has developed publically available air temperature forecast models for Alaska based on Global Circulation Models (GCM) and various Representative Concentration Pathways (RCP) the SNAP group considers most applicable for Alaska. For this summary we used forecast data based on RCP 6.0 (watts/m²).

Based on the SNAP forecast air temperature data, estimated engineering climate indices for the 2040-2049 period are summarized below. Design values are based on the mean of the 5 Model average and maximum values. As indicated in the summary data, the historic and forecast mean annual air temperatures, thaw and freeze indices infer permafrost would not be expected in this area



<u>Period</u>		<u>Average Air Temperature</u>	<u>Freeze Index</u>	<u>Thaw Index</u>
1961-1990	Mean	32.6 F	2,450 F-days	2,800 F-days
2040-2049	5 Model Mean	37.9 F	1,330 F-days	3,540 F-days
2040-2049	Maximum	45.6 F	80 F-days	5,080 F-days
2040-2049	Minimum	28.5 F	3,540 F-days	2,340 F-days

Maximum: Warmest Values from all 5 GCM Models

Minimum: Coldest Values from all 5 GCM Models

DESIGN (AVE 5 MODEL AVE AND MAX) 2,430 F-days 4,310 F-days

9.0 DISCUSSION

The proposed development will include placement of a granular fill pad connected to the existing roadway and extending about 100 feet southward to facilitate the new power plant building, fuel storage tanks and vehicle accessways. We understand the fill will be placed during summer 2017 in advance of the power plant module delivery.

The site has 4- to 5-feet of organic material overlying mineral silt. The mineral silt is considered suitable for shallow foundation load bearing, provided the mineral silt soil fabric is not damaged during site preparation. This is particularly important since elevated soil moistures near the material's plastic limit are present that can readily damage the silt soil fabric.

At the laboratory determined organic contents in the upper 4- to 5-feet organic layer, this layer will experience consolidation under sustained loads if not removed under load bearing elements. Ideally, in load bearing or settlement sensitive areas, the organic material should be removed to mineral silt and backfilled with sand and gravel to grade. However, we understand complete removal of the organic layer may be cost prohibitive. We have developed estimated settlement ranges if site preparation results in about two feet of the organic layer remaining in-place with sand and gravel fill placed to finish grade in load bearing areas.

We also understand the preferred foundation system for the power plant module is a nominal 4 foot by 5 foot square, concrete pedestal about 2 feet thick. One pedestal will be located near each corner of the power plant module. The base of the pedestal will be seated about 2 feet below grade with smaller dimensioned riser to allow for a nominal 4 to 6-inch air space between the base of the module and finish grade.

The relocated fuel tank is a prefabricated, skid mounted system. The fuel tank will be placed at-grade on concrete or All Weather Wood (AWW) sills orientated transverse to the tank skids. All mechanical connections to the fuel tank will be flexible to allow for differential movements.

10.0 ENGINEERING RECOMMENDATIONS

Based on our site findings, the site is considered suitable for the proposed power plant module and skid mounted fuel founded on shallow foundations. Site preparation will be required, including placement of structural fill. As noted previously, some portions of the in-place surface organic mat may remain in load bearing areas. If so, some additional settlement should be expected in these areas, as noted below.

10.1 Site Preparation

Locally obtained sand and gravel fill will be placed throughout the planned development area. The fill pad is expected to connect directly with the existing roadway fill prism and extend about 100 feet normal to the roadway alignment. Existing grade under the proposed fill pad slopes away from the roadway prism, thus a thicker fill section is anticipated along the distal edge of the fill pad relative to the contact at the existing roadway.

Rough civil grades indicate the fill pad finish grade will be near elevation 126 feet msl with the existing pre-fill ground elevation near 120 feet msl near the distal end of the top of pad fill grade. Thus, approximately 6 feet of fill is anticipated at the distal end of the fill pad, excluding any additional overexcavation of the in-place organic layer.

The existing roadway side slope fill should be scarified and, if needed, benched prior to placement of new fill. Ideally, all organics should be removed within the load bearing or settlement sensitive portions of the fill pad. However, this may require removal of an additional 4 to 5 feet of material beneath the planned fill section. We understand complete removal of the fill material may be cost prohibitive and removal of approximately one-half (about 2 feet) of the organic material is desired as a cost savings measure, pending acceptance of the estimated additional settlement of the organic material with this option.

10.2 Geotextile

A geotextile separation material similar to Geotex 801 is recommended under all fill sections.

10.3 Structural Fill

All new fill should be well graded sand and gravel meeting the Alaska Department of Transportation and Public Facilities Subbase "A" gradation and material properties. Fill should be placed in nominal 12-inch thick lifts using fully thawed and moisture conditioned material. A thicker fill section up to 18-inches thick may be used for the initial placement over the mineral silt or in-place organics.

All fill should be mechanically compacted to at least 95-percent of the material's maximum dry density as determined by the modified Proctor method, ASTM D-1557. Static (non-vibratory) compaction effort may be initially warranted for the basal fill lift over the mineral silt or in-place organics depending on conditions at the time of fill placement.

Fill should be placed to finish grade per the civil engineer's line and grade plans. Side slopes of 2H:1V (horizontal:vertical) or shallower should be used. If the organics are not removed under the fill pad side slopes, some additional differential settlement and possible side slope maintenance should be expected.

10.4 Power Plant Module Foundation Allowable Bearing Capacity

We understand precast concrete pedestals (shallow foundations) are planned for the power plant module. The square pedestals should be seated on properly compacted, granular fill, ideally over stiff mineral soil. The isolated pedestals should be no greater than 20 square feet without our prior authorization. The base of the footing excavation should be smooth and compacted before the pedestal is placed. If soft or loose material is found at the base of foundation excavation, the excavation should be deepened to remove the weak soil. The overexcavation should be backfilled with structural fill placed in thin lifts and each lift properly compacted.

If all organics are removed prior to placement of structural fill, an allowable bearing capacity of 2,700 pounds per square foot (psf) is recommended. If up to two feet of organic silt is left in place under the structural fill, the allowable bearing capacity should be reduced to 2,000-psf in order to maintain our estimated settlements discussed below. A one-third increase in these allowable bearing capacities are permitted for short-term, transient load states.

The in-place organic and mineral soils below the structural fill are considered frost susceptible materials based on the US Army's Soil Frost Classification system. As such, the in-place soils may experience seasonal frost related movements if water and subfreezing temperatures are present.

Based on a modified Berggren analysis using structural fill geotechnical properties and climate design indices summarized previously, seasonal frost may extend into the organics and silt underlying the structural fill at this site, particularly in areas with thinner structural fill sections.

Since the structure is have a cold space under the building, the foundations should be protected from frost related forces and potential movements by wrapping the vertical faces with a frost bond break such as 3 to 4 layers of polyethylene sheeting and insulating the ground above the foundations. For a cold foundation, a 3-inch thick layer of extruded or expanded polystyrene insulation should extend at least four (4) feet horizontally in all directions from the pedestal perimeter faces.

All final grades should direct surface water away from the building.

10.5 Fuel Tank Sill

AWW or concrete sills are recommended under the fuel tank skids. The sill should be oriented normal to the long axis of the skids as a single structural member under both skids and extend at least one foot beyond the outside perimeter of the skids. The sill should be at least 4-inches thick or as recommended by the civil or structural engineer. The sills should be located under the tank skid bearing points and extend about 3 feet wide (for example 3 each nominal 4x12 AWW members). The individual sill members should be structurally connected as recommended by the civil or structural engineer.

10.6 Power Plant Estimated Foundation Settlement

If all organics are removed prior to placement of structural fill, an estimated total settlement of 1-inch with about ½-inch differential is estimated for the power plant module

If two feet of organic silt is left in place under the structural fill, up to 3 inches of total settlement should be anticipated, provided the structural fill is placed and compacted in sufficient time to achieve about 3 inches of primary settlement of the organic layer. The primary settlement is expected to occur roughly concurrent with structural fill placement and compaction.

10.7 Lateral Resistance

Lateral resistance will be develop as base friction along the bottom of the pedestals and as passive resistance along the faces of the pedestal risers. A basal friction coefficient of 0.25 can be used with axial dead loads imposed on the pedestals. A net equivalent fluid passive resistance of 180 pounds per cubic foot (pcf) per foot width of the pedestal vertical face can be used. For this project, the net equivalent fluid should start one foot below finish grade at the pedestal riser.

10.8 Seismic Considerations

The site is considered a seismic class "D" for geotechnical purposes. The risk of liquefaction is considered low due to the plastic behavior of the in-place mineral silt and the absence of groundwater at shallow depth expected at this site.

10.9 Inspection

The construction of the foundation system should be inspected by an experienced engineer at the time of the work. If soil conditions are found to be different than those assumed in this analysis, we should be notified so that our conclusions can be reviewed and modified as required for the actual observed conditions.

11.0 USE OF REPORT

This report has been prepared exclusively for the use of UMIAQ as documentation for the Clark's Point Power Plant improvements. If there are significant changes in the nature, design, or location of the project, we should be notified so that a written modification or verification of the changes be provided. The work program followed the standard of care expected of professionals undertaking similar work in Alaska under similar conditions. No warranty expressed or implied is made.

12.0 CLOSURE

Thank you for the opportunity to work with you on this project. We will be happy to answer questions and provide additional formation. Please contact Richard Mitchells if you have questions or comments.

GOLDER ASSOCIATES INC.

Jessa Karp / For

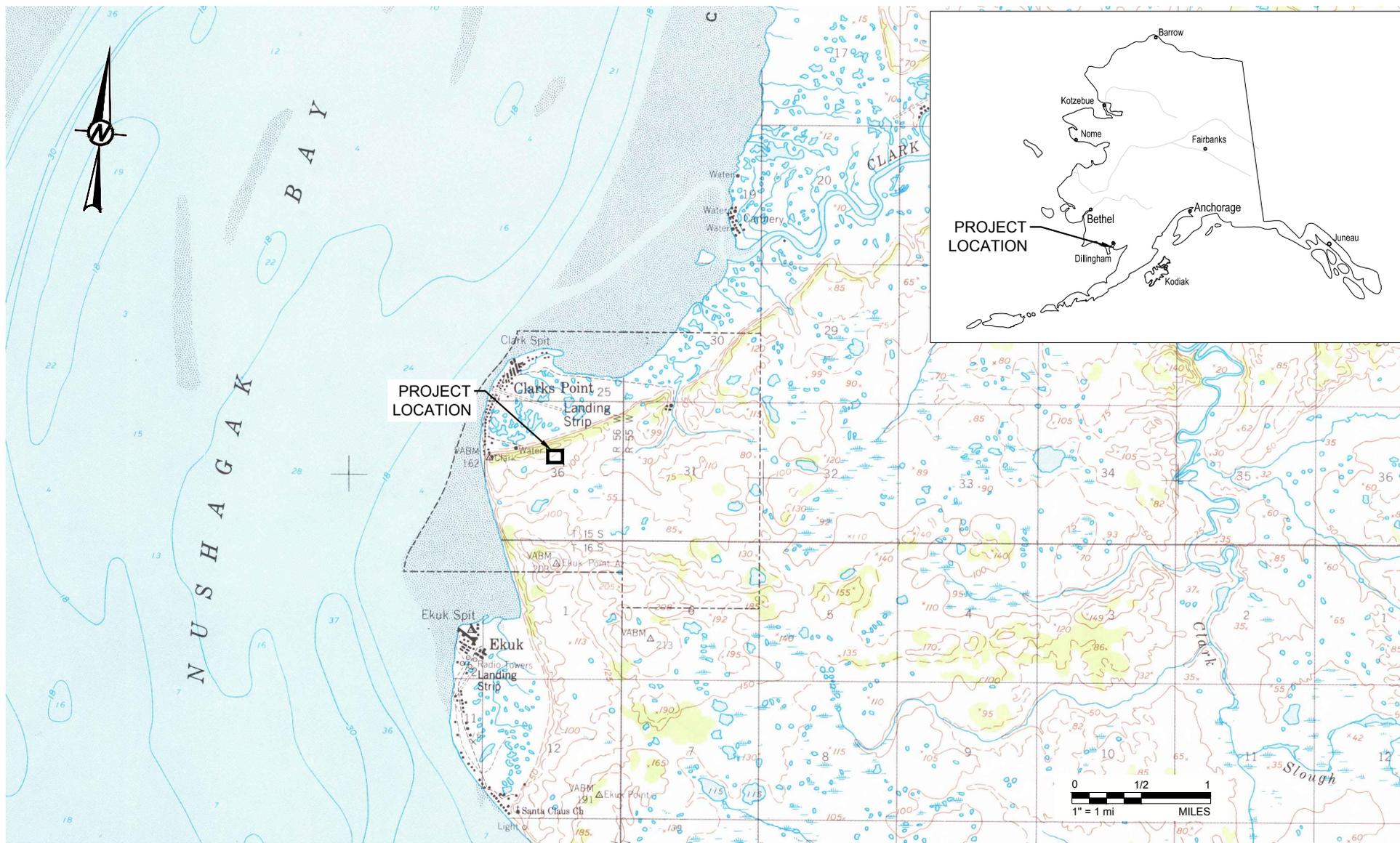
Jessa Karp
Geologist

Richard Mitchells

Richard Mitchells
Principal and Senior Geotechnical Engineer

Attachments: Figure 1: Vicinity Map
Figure 2: Site Map
Figure 3: Test Pit Location Mat
Figure 4: Material Borrow Site Location
Appendix A: Test Pit Logs
Appendix B: Laboratory Data

FIGURES



REFERENCE(S)
 1:63,360 SCALE TOPOGRAPHIC MAP PRODUCED AND DISTRIBUTED BY
 USGS. QUADRANGLE USED WAS NUSHAGAK BAY (D-2), ALASKA (1985).

CLIENT
UMIAQ

CONSULTANT



YYYY-MM-DD	2016-12-14
DESIGNED	-
PREPARED	APG
REVIEWED	JEK
APPROVED	RAM

PROJECT
CLARKS POINT POWER PLANT

CLARKS POINT, ALASKA

TITLE
VICINITY MAP

PROJECT NO.
1659158

CONTROL

REV.
A

FIGURE
1

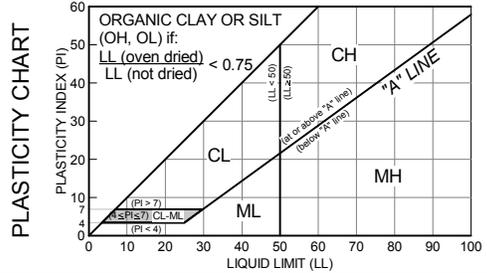
1 in. IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI A.

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**APPENDIX A
TEST PIT LOGS**

UNIFIED SOIL CLASSIFICATION (adapted from ASTM D2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES AND GROUP SYMBOLS USING LABORATORY TESTS	GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4. SIEVE	CLEAN GRAVELS <5% FINES $C_u \geq 4$ AND $1 \leq C_c \leq 3$	GW WELL-GRADED GRAVEL
		$C_u < 4$ AND/OR [$C_c < 1$ OR $C_c > 3$]	GP POORLY GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES FINES CLASSIFY AS ML OR MH	GM SILTY GRAVEL
		FINES CLASSIFY AS CL OR CH	GC CLAYEY GRAVEL
	SANDS ≥50% OF COARSE FRACTION PASSES ON NO. 4. SIEVE	CLEAN SANDS <5% FINES $C_u \geq 6$ AND $1 \leq C_c \leq 3$	SW WELL-GRADED SAND
		$C_u < 6$ AND/OR [$C_c < 1$ OR $C_c > 3$]	SP POORLY GRADED SAND
		SANDS AND FINES >12% FINES FINES CLASSIFY AS ML OR MH	SM SILTY SAND
		FINES CLASSIFY AS CL OR CH	SC CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	CL LEAN CLAY	
		ML SILT	
		OL ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT ≥50	CH FAT CLAY	
		MH ELASTIC SILT	
		OH ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS	PRIMARYLY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR	PT PEAT	



NOTES:

$$C_u = \frac{D_{60}}{D_{10}} \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

Gravels or sands with 5% to 12% fines require dual symbols (GW-GM, GW-GC, GP-GM, GP-GC, SW-SM, SW-SC, SP-SM, SP-SC) and add "with clay" or "with silt" to group name. If fines classify as CL-ML for GM or SM, use dual symbol GC-GM or SC-SM. $D_{(X)\%}$ is soil particle diameter where X% is % finer. *Optional Abbreviations:* Lower case "s" after USCS group symbol denotes either "sandy" or "with sand" while "g" denotes either "gravelly" or "with gravel"

RELATIVE DENSITY / CONSISTENCY ESTIMATE USING STANDARD PENETRATION TEST (SPT) VALUES (adapted from Terzaghi and Peck 1967 and NAVFAC DM 7.1)

COHESIONLESS SOILS ^(a)		COHESIVE SOILS ^(b)		UNCONFINED COMPRESSIVE STRENGTH (TSF) ^(d)
RELATIVE DENSITY	$(N_1)_{60}$ (blows/ft) ^(c)	CONSISTENCY	$(N_1)_{60}$ (blows/ft) ^(c)	
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
COMPACT (MEDIUM DENSE)	10 - 30	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

(a) Soils consisting of gravel, sand, and silt, either separately or in combination possessing no characteristics of plasticity, and exhibiting drained behavior.
 (b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.
 (c) Refer to ASTM D1586 for a definition of N value. $(N_1)_{60}$ is the N value corrected for hammer energy and overburden pressure, and is detailed in ASTM D6066. N values may be affected by a number of factors including: material size, sampler size, hammer weight and type, depth, drilling method, and borehole disturbance. **N values are only an approximate guide for cohesive soil and do not apply to frozen soil.**
 (d) Undrained shear strength, $s_u = 1/2$ unconfined compression strength, U_c . Note that Torvane (TV) measures s_u and pocket penetrometer (PP) measures U_c .

CRITERIA FOR DESCRIBING MOISTURE CONDITION (adapted from ASTM D2488)

DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL IS BELOW WATER TABLE

COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
BOULDERS	GREATER THAN 12 in.
COBBLES	12 in. to 3 in.
GRAVEL	3 in. to #4 Sieve (4.76 mm)
COARSE GRAVEL	3 in. to 3/4 in.
FINE GRAVEL	3/4 in. to #4 (4.76 mm)
SAND	#4 (4.76 mm) to #200 (0.074 mm)
COARSE SAND	#4 (4.76 mm) to #10 (2.0 mm)
MEDIUM SAND	#10 (2.0 mm) to #40 (0.42 mm)
FINE SAND	#40 (0.42 mm) to #200 (0.074 mm)
SILT & CLAY (FINES)	SMALLER THAN #200 (0.074 mm)

SAMPLER ABBREVIATIONS

SS SPT Sampler (2 in. OD, 140 lb hammer)	C Core (Diamond Bit)
HD Heavy Duty Split Spoon (3 in. OD, 340 lb hammer)	TW Thin Wall (Shelby Tube)
-BL Brass Liners used in Split Spoon	TP Thin Wall Piston Sampler
R Refual when driving Split Spoon	MS Modified Shelby
CA Continuous Core (Soil in Hollow-Stem Auger)	MC Geoprobe Macro-Core
GS Grab Sample from Surface / Testpit	RC Air Rotary Cuttings
AC Auger Charge	AW Auger Wash
	AG Auger Cuttings

DESCRIPTIVE TERMINOLOGY FOR PERCENTAGES (ASTM D2488)

DESCRIPTIVE TERMS	RANGE OF PROPORTION
TRACE	0 - 5%
FEW	5 - 10%
LITTLE	10 - 25%
SOME	30 - 45%
MOSTLY	50 - 100%

LABORATORY TEST AND NOTES ABBREVIATIONS / SYMBOLS

Con Consolidation	PID Photoionization Detector	TXCD Triaxial, Consolidated Drained
Dd Dry Density	PM Modified Proctor (D1557)	TXCU Triaxial, Consolidated Undrained
K Thermal Conductivity	PP Pocket Penetrometer (Field)	TXUU Triaxial, Unconsolidated Undrained
MA Sieve and Hydrometer	PTLD Point Load	W_L Liquid Limit (LL)
NP Non-plastic	SA Sieve Analysis	W_p Plastic Limit (PL)
OLI Organic Loss	SpG Specific Gravity	Ω Soil Resistivity (Res.)
P200 Passing #200 Sieve (D1140)	TC Thaw Consolidation/Strain	▼ Water Level
pH Soil pH	TV Torvane (Field)	▽ Water Level While Drilling
PI Plasticity Index (D4318)		

LIBRARY-ANCIG-7-15\GLB [ANC_SOIL_LEGEND] 8/20/15



SOIL CLASSIFICATION / LEGEND

Figure A-1

RECORD OF TEST PIT TP-01

SHEET 1 of 1

PROJECT: Clark's Point Power Plant
 PROJECT NUMBER: 1659158
 LOCATION: Clark's Point, Alaska

CLIENT: UMIAQ
 EXCAVATION DATE: 11/17/2016
 EQUIPMENT: CAT 416C

DATUM: n/a
 ELEVATION: n/a
 COORDS: 58.83457° N 158.54414° W

DEPTH (ft)	SOIL PROFILE				SAMPLES		SALINITY (ppt) Δ			NOTES TESTS WATER LEVELS			
	DESCRIPTION	ICE BOND	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	WATER CONTENT (PERCENT)					
					DEPTH (ft)			W _p	W _L		W _u		
0	0.0 - 5.0 Moist, dark brown, ORGANIC SILT; some fine-grained sand, fibrous organics, organic odor (OL) 5.0 - 7.0 Moist, light brown, SILT; trace fine-grained sand, low plasticity (ML) 7.0 - 7.5 Moist, gray with rust colored spots, SILT; little fine-grained sand, low plasticity, rust colored spots (ML)		OL	[Graphic Log]		1	GS				71	Gravel = 0%, Sand = 44%, Fines = 56.0%, OLI = 17%, SA Gravel = 0%, Sand = 30%, Fines = 69.9%, OLI = 16% Gravel = 0%, Sand = 5%, Fines = 95.4%, MA PI = 2	
5						5.0	2	GS					67
					ML		3	GS					53
					ML		7.0	4	GS		H		○
10	Test pit completed at 7.5 ft.												
15	NOTES: 1. Bottom of test pit at 7.5 feet below ground surface. 2. No groundwater observed. 3. Backfilled with excavated soils.												
20													
25													
30													
35													
40													

1659158 CLARKS POINT POWER PLANT.GPJ LIBRARY-ANC(12-5-16).GLB [ANC TESTPIT] AGarrigus 1/5/17



DEPTH SCALE: 1 inch to 5 feet
 EXCAVATION CONTRACTOR:
 OPERATOR: H. Wasilly

LOGGED: J. Karp
 CHECKED: RAM
 CHECK DATE: 2017-01-05

Figure A-2

RECORD OF TEST PIT TP-02

SHEET 1 of 1

PROJECT: Clark's Point Power Plant
 PROJECT NUMBER: 1659158
 LOCATION: Clark's Point, Alaska

CLIENT: UMIAQ
 EXCAVATION DATE: 11/17/2016
 EQUIPMENT: CAT 416C

DATUM: n/a
 ELEVATION: n/a
 COORDS: 58.83456° N 158.54443° W

DEPTH (ft)	SOIL PROFILE				SAMPLES		SALINITY (ppt) Δ				NOTES TESTS WATER LEVELS	
	DESCRIPTION	ICE BOND	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	WATER CONTENT (PERCENT)				
					DEPTH (ft)			W _p	W _L	W _p		W _L
0	0.0 - 4.0 Moist, dark brown, ORGANIC SILT; little fine-grained sand, fibrous organics, organic odor (OL)		OL	[Graphic Log]		1	GS				70	
5	4.0 - 6.0 Moist, light brown, SILT; trace fine-grained sand (ML)		ML	[Graphic Log]	4.0	2	GS				H	OLI = 6%, PI = 2
10	6.0 - 10.0 Moist, gray, SILT with sand; trace to few fine-grained sand, low plasticity, rust colored spots (ML)		ML	[Graphic Log]	6.0	3	GS		○			Gravel = 0%, Sand = 2%, Fines = 98.2%, MA
10	Test pit completed at 10.0 ft. NOTES: 1. Bottom of test pit at 10 feet below ground surface. 2. No groundwater observed. 3. Backfilled with excavated soils.					4	GS		○			Gravel = 1%, Sand = 8%, Fines = 90.2%, OLI = 1%

1659158 CLARKS POINT POWER PLANT.GPJ LIBRARY-ANC(12-5-16).GLB [ANC TESTPIT] AGarrigus 1/5/17

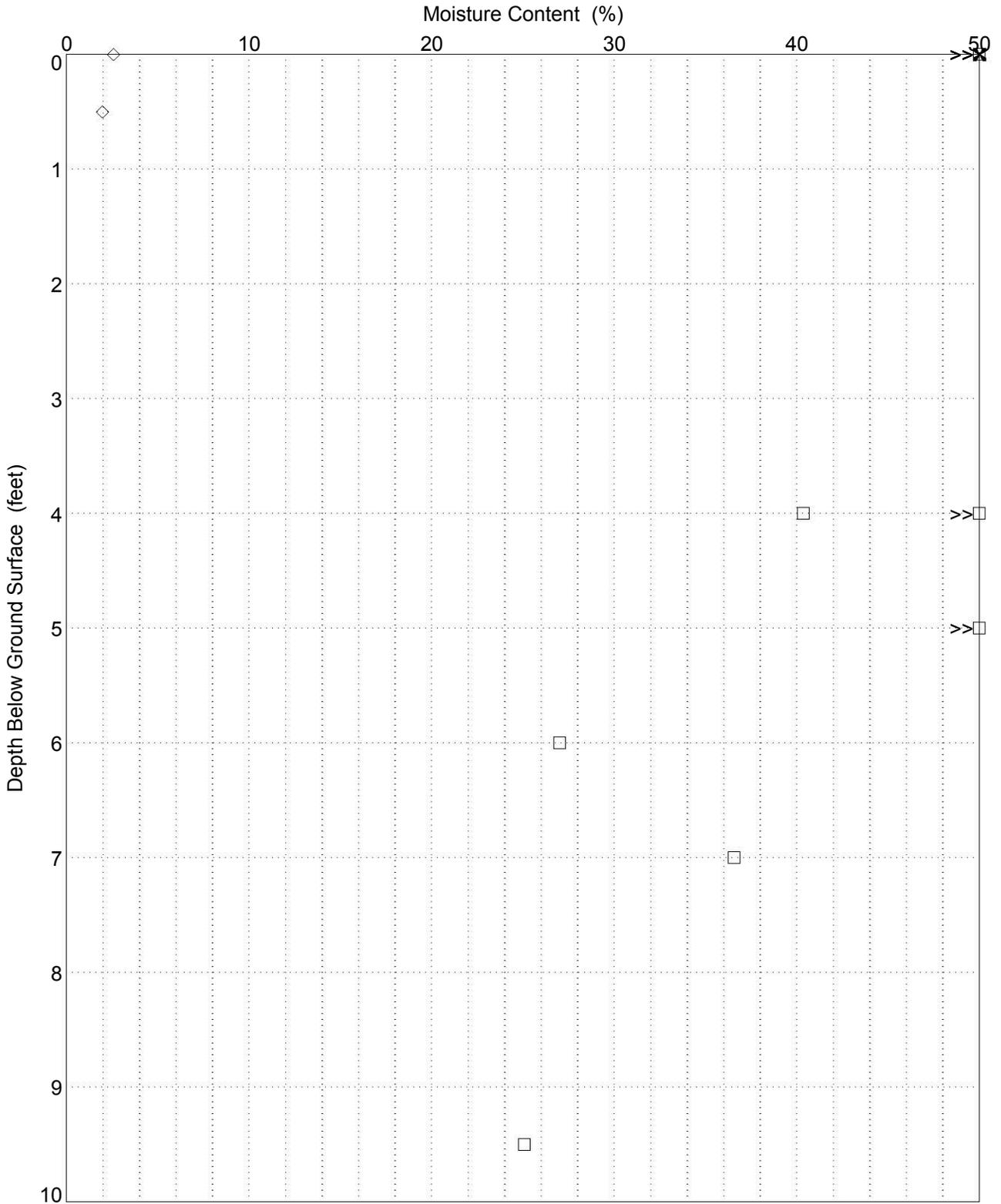


DEPTH SCALE: 1 inch to 5 feet
 EXCAVATION CONTRACTOR:
 OPERATOR: H. Wasilly

LOGGED: J. Karp
 CHECKED: RAM
 CHECK DATE: 2017-01-05

Figure
A-3

**APPENDIX B
LABORATORY DATA**



CL,CH,ML,CL-ML
 SM,SC
 SP,SW,SP-SM
 GP,GW,GP-GM
 GM,GC
 PT,OL,OH
 ICE,ICE+soil
 OTHER

NOTE: FILLED SOIL SYMBOL INDICATES FROZEN AND BONDED CONDITION

CLIENT
UMIAQ

PROJECT
CLARK'S POINT POWER PLANT

CONSULTANT



YYYY-MM-DD 2017-01-05
 PREPARED APG
 DESIGN N/A
 REVIEW MCF
 APPROVED RAM

CLARK'S POINT, ALASKA
 TITLE
MOISTURE CONTENT VS. DEPTH

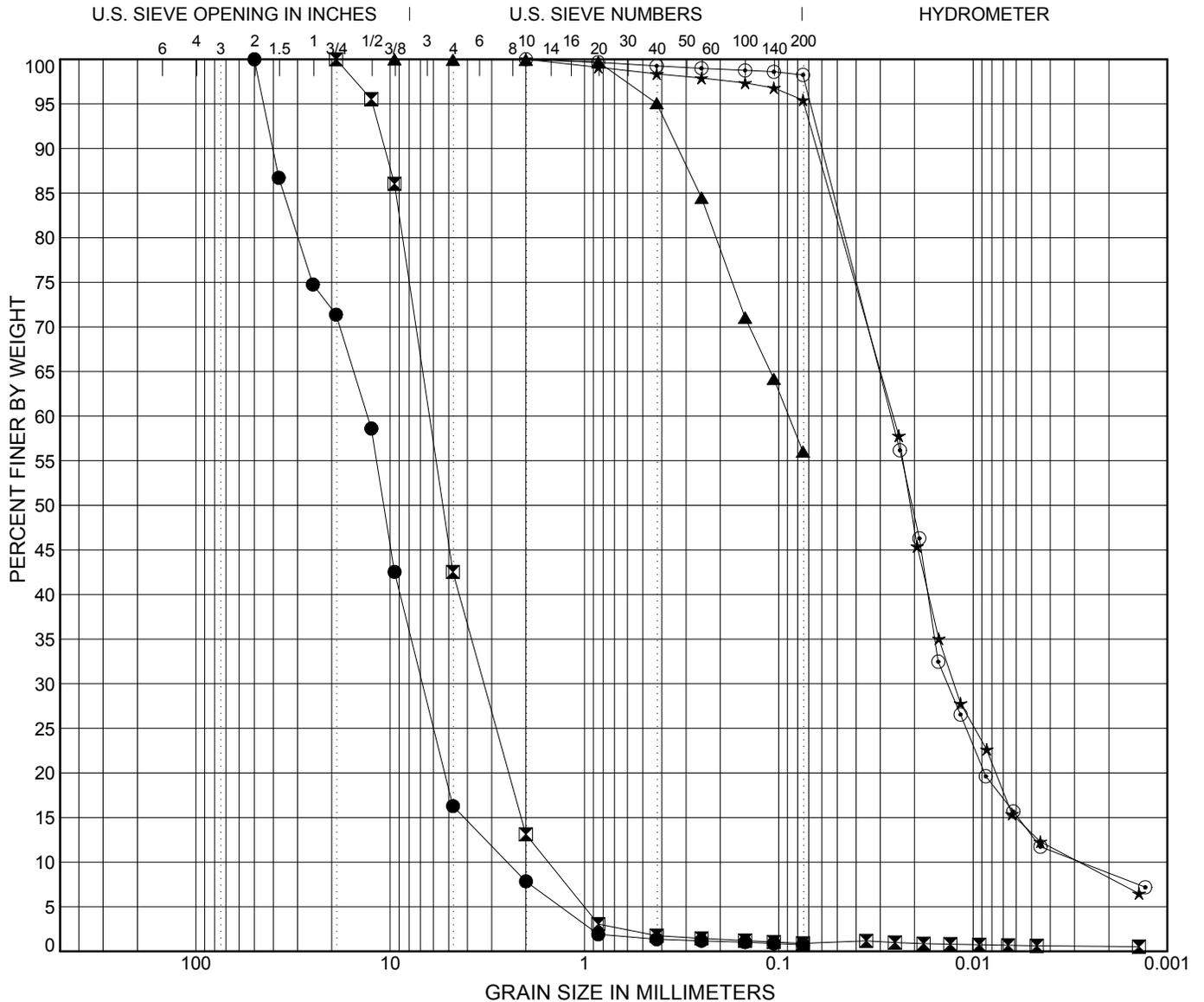
PROJECT No. CONTROL Rev. FIGURE
 1659158 B-1



FIGURE B-2: SUMMARY OF PARTICLE SIZE DISTRIBUTION RESULTS

Reference(s)
ASTM D422
ASTM D6913

Client: UMIAQ	Project No.: 1659158
Project: Clark's Point Power Plant	QA/QC By: J. Randazzo Date: 11/30/2016
Location: Clark's Point, Alaska	Reviewed By: M. Faulise Date: 12/2/2016



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

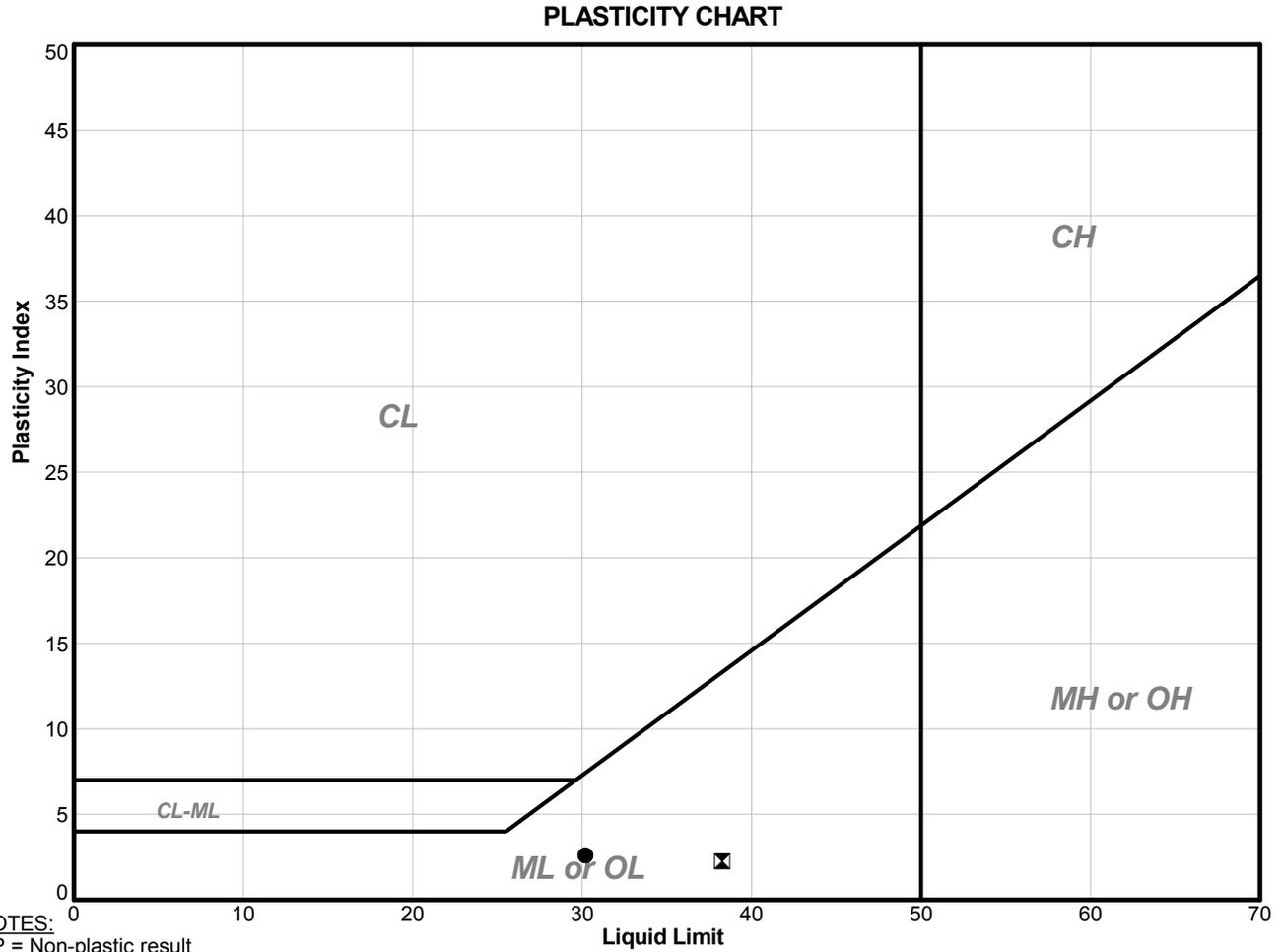
	Sample Location	Sample Number	Depth (ft)	USCS Classification	Cc	Cu	% Gravel	% Sand	% Fines	% < 0.02 mm
●	Borrow Source	1	0.0	well-graded gravel with sand (GW)	1.4	5.2	84	16	0.8	
☒	Borrow Source	2	0.5	well-graded gravel with sand (GW)	1.1	4.1	57	42	0.9	0.9
▲	TP-01	1	0.0	sandy silt (ML)	-	-	0	44	56.0	
★	TP-01	3	5.0	silt (ML)	2.2	9.1	0	5	95.4	47.1
⊙	TP-02	3	6.0	silt (ML)	2.5	9.4	0	2	98.2	48.7

1659158 CLARK'S POINT POWER PLANT.GPJ LIBRARY-ANC(12-5-16)_GLB [ANC LAB GRAIN SIZE] AGarrigus 1/5/17

FIGURE B-3: LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

 Reference(s)
ASTM D4318

Client: UMIAQ	Project No.: 1659158
Project: Clark's Point Power Plant	QA/QC By: J. Randazzo Date: 11/30/2016
Location: Clark's Point, Alaska	Reviewed By: M. Faulise Date: 12/2/2016



NOTES:
 NP = Non-plastic result
 Plastic Limit test performed by hand rolling
 Liquid Limit test performed using mechanical device

	Sample Location	Sample Number	Depth (ft)	Bottom (ft)	Passing #40 Sieve (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	USCS	Natural Moisture Content (%)
●	TP-01	4	7.0	7.5		30	28	2	ML	37
☒	TP-02	2	4.0	4.5		38	36	2	ML	40

1659158 CLARK'S POINT POWER PLANT.GPJ LIBRARY-ANC(12-5-16).GLB [ANC LAB ATTERBERG CASAGRANDE MULTI (10)] A Garrigus 1/5/17

April 16, 2018

1655199

Steve Stassel, PE

Gray Stassel Engineering, Inc.
1000 O'Malley Road, Suite 200B
Anchorage, AK 99515

GEOTECHNICAL FINDINGS AND RECOMMENDATIONS, PORT HEIDEN POWERPLANT

Steve:

This submittal summarizes Golder Associates Inc. (Golder) site findings and geotechnical recommendations for the proposed replacement powerplant in Port Heiden, Alaska. Our services were provided to Gray Stassel Engineering, Inc. (GSE) to support the design of the new structure. The replacement powerplant is being developed and funded by the Alaska Energy Authority (AEA) for remote site piston power generation and switchgear primary power. At this time, we understand the project is at the concept-level design and two options are being considered for the replacement powerplant; a field constructed slab-on-grade structure and a prefabricated modular system. GSE in conjunction with the community and AEA will determine the preferred structure design.

1.0 BACKGROUND AND REGIONAL GEOLOGIC SETTING

The replacement powerplant is expected to be a single-story structure of either on-site wood or steel frame or prefabricated steel modular construction. The building footprint is expected to be expected nominally 20 feet by 40 feet. The structure will house a series of reciprocating piston prime mover electric power generators, electric switchgear and operation/maintenance facilities inside a heated building. Fuel source will be provided from the bulk fuel storage facility immediately adjacent to the powerplant.

For the on-site constructed option, a reinforced slab-on-grade concrete floor will be constructed. The modular option will have integral steel frame and flooring systems. Both options are envisioned to use shallow concrete foundations where feasible.

The project site is located on the north side of the Alaska Peninsula along the Meshik River. The Alaska Peninsula and Port Heiden are located along a tectonically active zone. The project site is located approximately 60 miles northeast of the volcanically active Mount Veniaminof and approximately 20 miles west of the less active Mount Aniakchak. The Mount Aniakchak caldera is the result of a large eruption that occurred roughly 3,500 years ago resulting in significant volcanic ash deposits throughout the Port Heiden area.

The Alaskan Peninsula has been subjected to glacial activity, most recently about 10,000 years ago. The glacial activity has resulted in moraine and glacial outwash deposits. Permafrost is absent in the region surrounding the project site, however isolated relict permafrost can be encountered in areas with thicker organic cover.

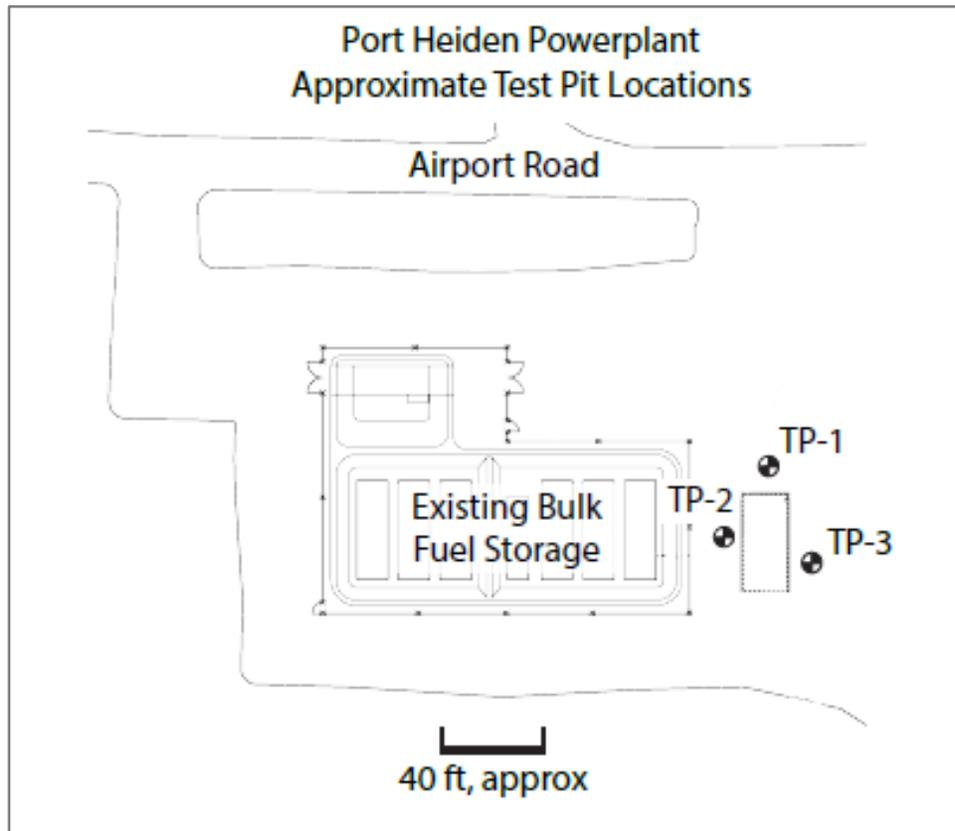
2.0 SITE INVESTIGATION

Golder engineer Richard Mitchells and GSE engineer Steve Stassel travelled to the site August 29, 2017 to observe the proposed site and advance geotechnical explorations near the planned development footprint. The proposed powerplant site is located immediately adjacent to the eastern side of the recently constructed bulk fuel storage facility. At the time of our site visit the bulk fuel facility was operational. The proposed site for the replacement powerplant was approximately 20 to 40 feet east of the bulk fuel facility on a granular fill pad. At the time of our site work, a large abandoned storage tank on temporary timber cribbing was present at the proposed replacement powerplant location, thus the test pits were advanced around the margins of the abandoned tank. The pad fill thinned toward the south side of the abandoned storage tank to a disturbed vegetative surface mixed with thin layers of granular fill. The estimated replacement powerplant footprint was inferred to be entirely over the granular fill area, away from the observed surface vegetative mat area.



Proposed Powerplant Site, August 29, 2017, view southwest

Three shallow test pits were advanced near the proposed powerplant footprint as part of the project site assessment effort. The test pits were advanced with a local JD 214S rubber tire backhoe. The test pits were advanced to about 6 to 7 feet below grade, the safe working depth of the equipment.



3.0 SUBSURFACE CONDITIONS

The test pits were visually logged as they were advanced with disturbed but representative soil samples were retained at select intervals from the test pit sidewalls or the backhoe bucket. The soils encountered were visually described in the field in general accordance with ASTM D-2488 and the Unified Soil Classifications System (USCS).

Generally similar subsurface conditions were encountered in all three test pits. Unclassified granular fill was encountered overlying sequences of in-place organics and organic silt becoming a mineral silty sand were encountered to about 2 to 3 feet below grade. The test pit nearest the bulk fuel facility encountered apparent imported sand and gravel fill over a geotextile encountered about 3 feet below grade. All three test pits encountered sand with some fine grained gravel starting approximately 3 feet below grade. The sand soil continued to the base of the excavations. In all three test pits, water seepage was noted starting about 5 to 6 feet below grade. Upon completion of the geotechnical explorations, each test pit was backfilled with the excavated soil and tamp compacted with the backhoe bucket to surrounding grade. Summary test pit logs are provided at the end of the text.



4.0 GEOTECHNICAL LABORATORY ANALYSIS

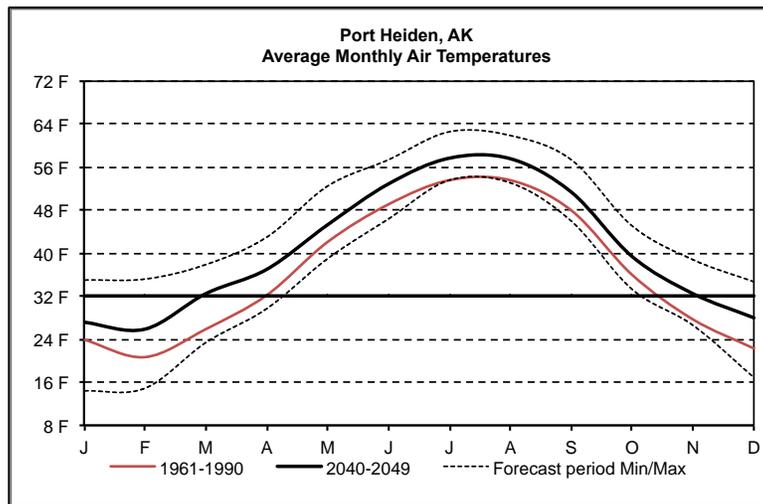
Laboratory testing of the soil samples was conducted at Golder’s Anchorage US Army Corps of Engineers validated geotechnical laboratory. Laboratory tests were conducted on select retained soil samples to aid with visual soil classifications and to determine soil index properties to aid with our geotechnical engineering analysis. Soil index property testing included moisture content per ASTM D2216 and particle size distribution per ASTM D422. The results of the laboratory tests conducted on select soil samples are provided as attachments to this report

5.0 ENGINEERING CLIMATE INDICES

Port Heiden is characterized by warm summers with relatively limited winter freezing periods. However, winter cold periods can occur with the potential for seasonal frost induced movements in unheated areas. Climate and associated key air temperature engineering parameters are modeled to reflect anticipated continued warming trends over the expected service life of the planned development.

Test Pit 1, General Subsurface Conditions, August 29, 2017

To aid with our engineering analysis, we have summarized engineering climate indices for Port Heiden as modeled by the Scenarios Network for Alaska & Arctic Planning (SNAP) at the University of Alaska Fairbanks. The SNAP group uses five Intergovernmental Panel on Climate Change (IPCC) General Circulation Models (GCM) they consider most applicable for Alaska. SNAP includes several Representative Concentration Pathways (RCP) for their climate forecasts. For our analysis, a RCP of 6.0 (watts/m²) was used. The model analysis results have variability. SNAP forecast data include the five GCM model average as well as the minima and maxima individual model results for the selected analysis periods.



For our engineering analysis, the key climate parameters derived from the SNAP data for Port Heiden include Freezing Index (FI) and Thawing Index (TI), both as cumulate °F-days for each based on monthly average air temperature data. Summarized below are the SNAP derived approximate FI and TI data for the 1961-1990 historic and the 2040-2049 forecast period. As noted below, a general warming trend should be expected for the area over the project’s anticipated service life.

<u>Period</u>		<u>Average Air Temperature</u>	<u>Freeze Index</u>	<u>Thaw Index</u>
1961-1990	Mean	36.3 F	1,180 F-days	2,800 F-days
2040-2049	5 Model Mean	40.6 F	440 F-days	3,630 F-days
2040-2049	Maximum	46.8 F	0 F-days	5,430 F-days
2040-2049	Minimum	33.1 F	1,990 F-days	2,440 F-days
RECOMMENDED DESIGN INDICES			1,210 F-days	4,530 F-days

6.0 DISCUSSION AND RECOMMENDATIONS

Based on our field and laboratory findings, the site is considered suitable for the proposed development using shallow foundations that bear on the in-place sand with gravel or imported structural fill placed on the in-place sand with gravel. Our geotechnical recommendations are based, in part, on the foundations not being subjected to cyclic vibratory or machine loading states. If the building loads or prime movers are expected to impose vibratory or machine loads on the foundations, we must be contacted to review our recommendations presented herein.

The overlying unclassified fill, organic and higher silt content soils should be removed to the clean sand with gravel and backfilled with structural fill within all load bearing areas and floor slabs. The exposed in-place sand with gravel should be fully thawed, scarified about 6-inches deep and proof compacted to at least 95-percent of the material's maximum dry density as determined by the modified Proctor method, ASTM D-1557. A non-woven geotextile similar to Geotex 801 should be placed over the prepared in-place sand with gravel prior to structural fill placement.

Structural fill should be well-graded sand and gravel that meets the US Army Corps of Engineers Non-Frost Susceptible (NFS) classification. All structural fill should be moisture conditioned, fully thawed and placed in nominal 12-inch thick lifts then densified using mechanical compaction methods as recommended for proof compacting.

As noted previously, the design of the powerplant is at a conceptual-level with two primary options for the structure under consideration; a slab-on-grade for on-site building construction and a prefabricated modular facility. Different shallow foundation systems are anticipated for each option.

6.1 Slab-on-Grade Option

For the slab-on-grade option, a continuous shallow foundation system using a concrete stem wall is recommended. The structural engineer will provide the foundation and stem wall engineering recommendations. For this foundation option, an allowable soil bearing pressure of 2,500 pounds per square foot (psf) can be used provided our site preparation recommendations discussed above are adopted. A one-third increase in this allowable soil bearing pressure can be applied for short-term transient load states. The shallow foundations should extend at least 30-inches below finish grade with a stem wall and concrete slab-on-grade floor for a heated building. The continuous shallow foundations should be at 16-inches wide or as recommended by the structural engineer. With this option, it is important the foundations remain above freezing throughout their design life.

6.2 Prefabricated Modular Option

For the modular option, an isolated, reinforced concrete square post and pad foundation system bearing on structural fill can be used. For this option, we have assumed the foundation pads will be unheated. If so, we recommend a rigid insulation layer be placed below the foundation pads as a frost protection measure. The foundation pads can be designed for an allowable bearing pressure of 1,500-psf if rigid insulation with a rated compressive strength of 40-pounds per square inch (psi) is used. If a rigid insulation with a rated compressive strength of 60-psi is used under the foundation pads, an allowable bearing pressure of 2,500-psf can be used.

The site subgrade should be prepared as recommended above. For all loading cases, the foundation pads should be between 3 to 5 feet square (9 to 25 square feet). For geotechnical purposes, we have assumed the isolated pads will be approximately 2 feet thick. The civil and structural engineer will develop isolated pad dimensions and geometry. The top of the isolated pads should be elevated approximately 5 inches above finish grade or as recommended by the civil and structural engineer. This option also requires rigid insulation frost protection as discussed below. A minimum 8-inch high clear space between the base of the module and finish grade is recommended to allow for drainage and seasonal frost movement within the fill under the module. If isolated foundation pads less than 9 or greater than 25 square feet or less than 2 feet thick are planned, we must be notified to review our recommendations.

6.3 Foundation Frost Protection

Frost protection measures should be used for both options. The slab-on-grade option using continuous shallow foundations should include rigid insulation installed along the external faces of the perimeter foundation and stem wall and as appropriate for building appurtenances subject to seasonal frost related movements.

For the module option using isolated post and pad foundation option, a continuous rigid insulation section is recommended under the foundation pads. The rigid insulation should be at least 4-inches thick and extend at least five (5) feet horizontally in all directions from the foundation pad perimeter. For construction purposes, a continuous rigid insulation layer may be used under two or more isolated foundation pads. Rigid insulation should be extruded or expanded polystyrene material with a rated compressive strength of at least 40-psi at less than 10-percent strain. We recommend all rigid insulation be provided in 2-inch thick stock and placed with offset vertical joints. A fuel resistant liner is recommended over the rigid insulation that extends at least two (2) feet beyond the perimeter of the rigid insulation. We should review the final foundation frost protection measures during the design phase.

For all options, appurtenances attached to the building exterior should be designed to permit seasonal frost movements and differential settlement. Flexible connections and allowances for seasonal vertical and horizontal movements that will not result in damage are advised.

6.4 Lateral

Lateral resistance can be developed as base friction between the cast-in-place concrete foundations and the underlying structural fill. A frictional resistance of 0.4 can be applied at the foundation/structural fill contact, provided the structure's deadload is used to determine lateral resistance. In addition, passive resistance can be developed along the vertical foundation faces using an equivalent fluid approach. For this case, an active and passive equivalent fluid pressure of $30 \cdot H$ and $250 \cdot H$ pounds per cubic foot (pcf), respectively, can be applied. For each case "H" is the vertical foundation face height in feet, with the uppermost one foot below finish grade ignored.

Backfill along stem walls should be placed and compacted as recommended for structural fill in a balanced manner to reduce lateral stresses along subgrade walls during construction. If retaining walls are planned for the development, we should be contacted to provide geotechnical guidance and recommendations.

6.5 Settlement

If the site is prepared per our recommendations and the foundations placed in accordance with the design team's recommendations, a total settlement of 1-inch, differential of 0.75-inch is expected. However, if machine or cyclic loads are imposed on the foundations from the building or prime movers, a reduced allowable bearing capacity and/or increased settlements should be expected. We must be contacted if cyclic vibratory or machine loads are anticipated.

6.6 Seismic

Based on our interpretation of the frozen subsurface conditions encountered at this site and the general geology of the project area, we recommend soil Site Class "D" applied to this site. Seismic ground motion parameters for this site were developed based, in part, on the 2012 IBC, summarized below. The structural engineer, in conjunction with the design team, should determine the appropriate occupancy classification to develop the appropriate seismic response parameters for this structure.

Seismic Parameter	
Short Period Spectral Acceleration (S_s)	0.891g
1-second Period Spectral Acceleration (S_1)	0.413g
Short Period Spectral Response Acceleration (S_{MS})	1.019g
1-second Period Spectral Response Acceleration (S_{M1})	0.656g

Determined for coordinates 56.9230°N, 158.6644°W, as a Class I/II/III Risk Category

The site is underlain with saturated sand with the potential for liquefaction under specific seismic conditions. Our recommendations do not include soil liquefaction mitigation measures. If a refined geohazard risk evaluation for seismic hazards at this site is warranted, a more detailed geotechnical investigation program will be required.

7.0 CONSTRUCTABILITY CONSIDERATIONS

Select construction-phase considerations related to earthwork and foundation elements include:

- The site preparation and structural fill placement should be observed by an experienced member of the design team.
- Seasonal fluctuations in the groundwater elevations should be expected, particularly during periods of prolonged precipitation. Construction phase dewatering may be required to achieve our recommended site preparation and foundation placement. If so, dewatering is considered the responsibility of the contractor and all required permits and monitoring should be conducted.
- The civil engineer should provide recommendations for capillary breaks and water control for slab-on-grade option.

- All finish grades should direct surface water away from the structure, including finish grades under the module option.
- Roof drainages should consider armored material along their drip lines and channeled roof drainages should direct water away from the foundations.
- The contractor will be responsible for all construction-phase site safety including excavation sidewall stability.

8.0 USE OF REPORT

The summary geotechnical findings and recommendations presented herein were prepared for GSE and their design team for use in the design of the proposed replacement powerplant in Port Heiden, Alaska. The geotechnical recommendations are provided for two concept-level structure designs to aid with site development planning and engineering design. Golder will need to review the final design plans and specifications for conformance with our geotechnical recommendations provided with this submittal.

If there are significant changes in the nature, design, or location of the facilities, we should be notified so that we may review our conclusions and recommendations with consideration of the proposed changes and provide a written modification or verification of the changes.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by a limited number of explorations or soil samples. Such unexpected conditions frequently result in additional project costs to build the project as designed. Therefore, a contingency for unanticipated conditions should be included in the construction budget and schedule.

The work program followed the standard of care expected of professionals undertaking similar work in Alaska under similar conditions. No warranty expressed or implied is made.

We appreciate the opportunity to provide work on this project. Please contact Richard Mitchells at 907-865-2537 if you have questions or comments.

Golder Associates Inc.



Richard Mitchells, PE
Principal

Attachments: Summary geotechnical Laboratory Results

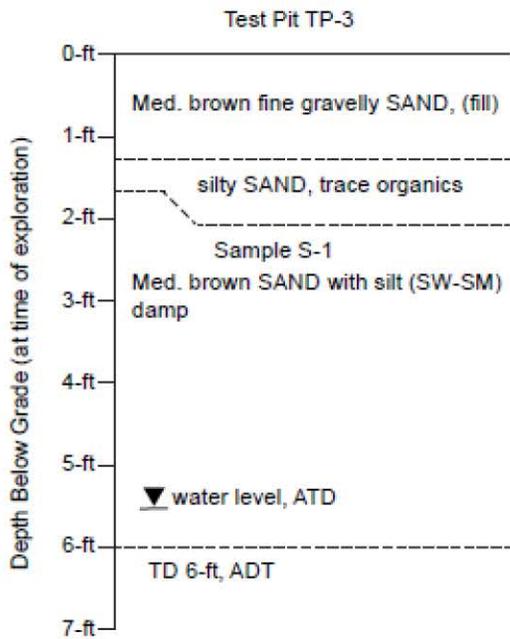
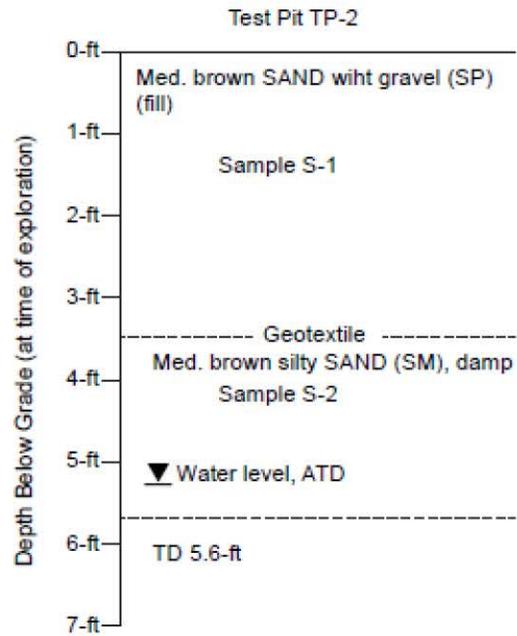
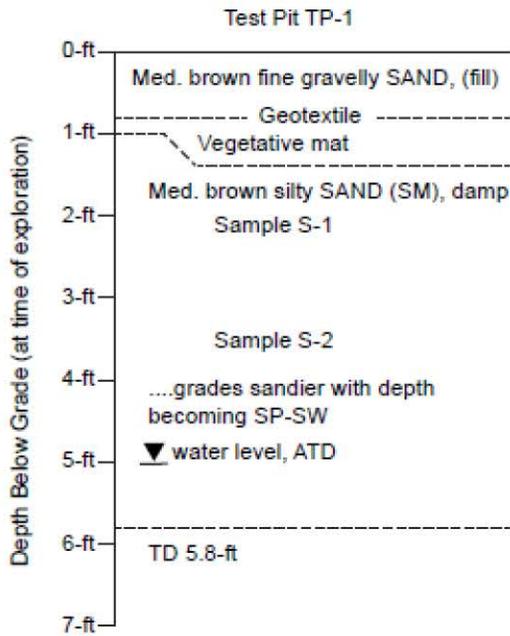


TABLE B-1: SAMPLE SUMMARY

Client: Gray Stassel Engineering, Inc.	Project No.: 1655199
Project: Port Heiden RPSU CDR	
Location: Port Heiden, Alaska	Reviewed By: T. Voeller Date: 9/29/2017

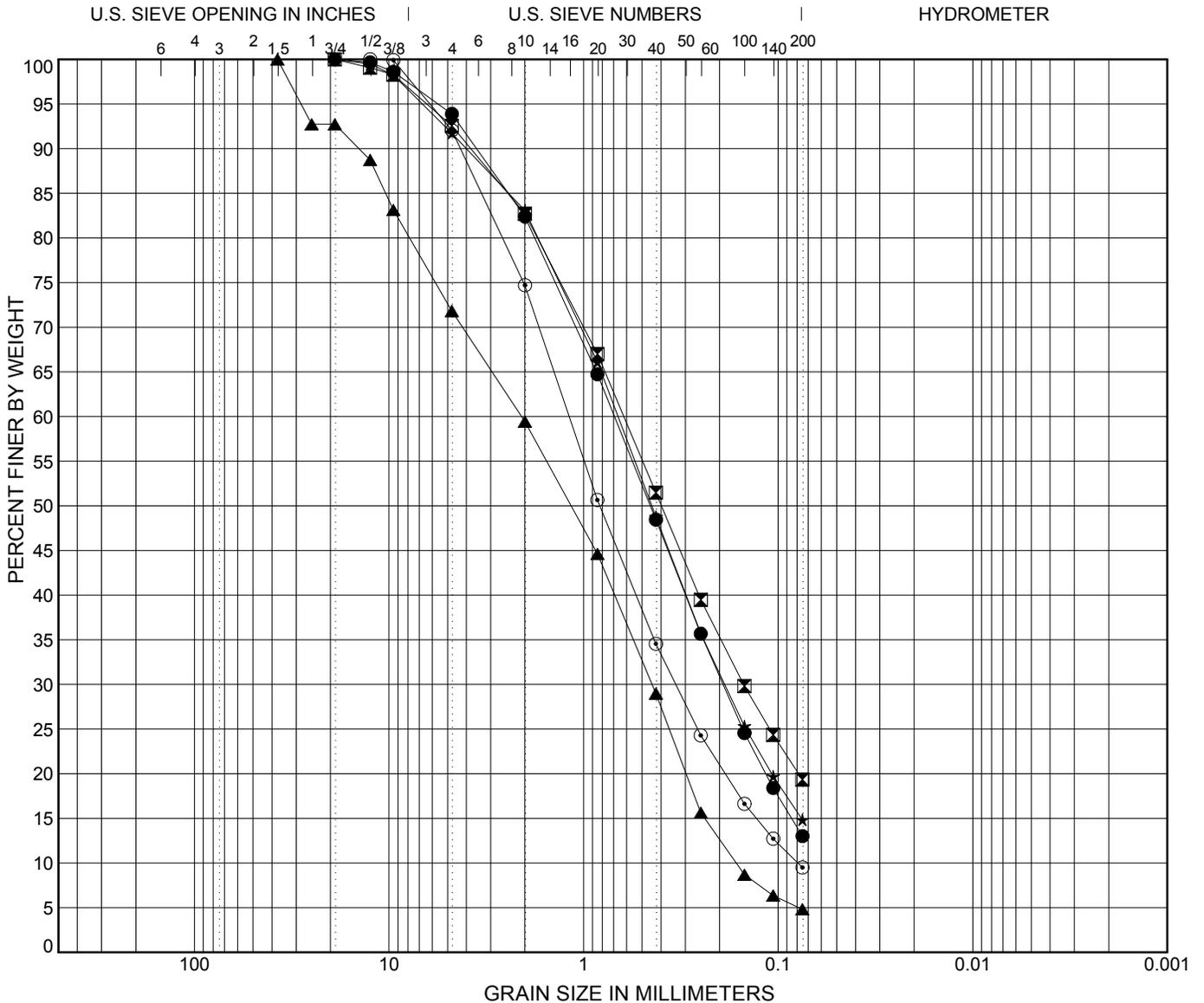
SAMPLING DATA							CLASSIFICATION AND INDEX TEST RESULTS										
SAMPLE LOCATION	SAMPLE NUMBER	DEPTH (ft)		RECOVERY (%)	SAMPLE TYPE	BLOWS PER FOOT	NATURAL MOISTURE CONTENT (%)	LIQUID LIMIT (LL) (%)	PLASTIC LIMIT (PL) (%)	PLASTICITY INDEX (PI) (%)	GRADATION (%)			ORGANIC CONTENT (%)	SALINITY (ppt) [^(d) is direct meas.]	DESCRIPTION (USCS)	TESTS / OTHER TESTS
		TOP	BOTTOM								GRAVEL	SAND	FINES (SILT & CLAY)				
TP-1	1	2.0	2.5		GS		26				6	81	13.0			SM	SA
TP-1	2	3.5	4.0		GS		36				7	73	19.4			SM	SA
TP-2	1	1.5	2.0		GS		8				28	67	4.8			SP	SA
TP-2	2	4.0	4.5		GS		31				8	77	14.8			SM	SA
TP-3	1	2.0	2.5		GS		21				8	83	9.5			SW-SM	SA

PORT HEIDEN.GPJ LIBRARY-ANC(3-16-18) - NEW LOGO.GLB [ANC_SAMPLE_SUMMARY] AGarrigus 4/13/18

FIGURE A-2: SUMMARY OF PARTICLE SIZE DISTRIBUTION RESULTS

Reference(s)
ASTM D422
ASTM D6913

Client: Gray Stassel Engineering, Inc.	Project No.: 1655199
Project: Port Heiden RPSU CDR	QA/QC By: J. Randazzo Date: 9/22/2017
Location: Port Heiden, Alaska	Reviewed By: T. Voeller Date: 9/29/2017



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location	Sample Number	Depth (ft)	USCS Classification	Cc	Cu	% Gravel	% Sand	% Fines	% < 0.02 mm
●	TP-1	1	2.0	silty sand (SM)	-	-	6	81	13.0	
⊠	TP-1	2	3.5	silty sand (SM)	-	-	7	73	19.4	
▲	TP-2	1	1.5	poorly graded sand with gravel (SP)	0.6	12.7	28	67	4.8	
★	TP-2	2	4.0	silty sand (SM)	-	-	8	77	14.8	
⊙	TP-3	1	2.0	well-graded sand with silt (SW-SM)	1.2	15.0	8	83	9.5	

PORT HEIDEN.GPJ LIBRARY-ANC(3-16-18) - NEW LOGO.GLB [ANC LAB GRAIN SIZE] A Garrigus 4/13/18